APPENDIX E
CULTURAL RESOURCES

E.1 OVERVIEW

This appendix provides supplemental information regarding the prehistoric and historic cultural resources present at LANL, including traditional cultural properties (TCP), that may be affected by ongoing and proposed LANL operations. Cultural resources are any prehistoric or historic sites, buildings, structures, districts, or other places or objects (including biota of importance) considered to be important to a culture, subculture, or community for scientific, traditional, or religious purposes, or for any other reason. While not all cultural resources need to be preserved, those with cultural significance require identification and protection so that future generations may be informed and enriched by the past.

In section E.2, information is presented regarding the results of previous cultural resource research in the LANL region. Section E.3 provides a summary of the background of the LANL region that led to a classification system developed for LANL, based on the regional cultural context of prehistoric and historic development on the Pajarito Plateau and the traditional cultures of the region. Section E.4 contains an overview of the major federal and state regulatory requirements concerning cultural resources. Section E.5 contains information regarding the research methods employed to identify, document, and assess the cultural resources likely to be affected by LANL operations. Detailed information is provided in section E.6 on the existing cultural resources that are protected by the *National Historic Preservation Act* (NHPA) (16 U.S.C. §470). Section E.7 is a list of references used in conducting this assessment and preparing this report.

Cultural resources are location-specific; therefore, the cultural resource study area is defined as the area within LANL's physical boundaries and those areas surrounding LANL that may be potentially affected by LANL activities. A broader study area has been defined for the identification and assessment of TCPs, because the TCP evaluation includes an assessment of historical use and value placed on cultural resources by existing cultural groups with current or ancestral ties to the LANL region, irrespective of their current locations.

E.2 PREVIOUS STUDY OF CULTURAL RESOURCES IN THE LANL REGION

The following subsections contain a history and summaries of previous studies of cultural resources in the LANL region.

E.2.1 Studies of Prehistoric Resources

The Pajarito Plateau is among the most intensively studied archaeological regions in the U.S. due in part to the density of archaeological sites. Archaeological study began in 1880 when Adolph Bandelier visited the Puye ruins and Rito de los Frijoles, measuring and taking notes on the ruins (Bandelier 1892). A survey of the Pajarito Plateau was made by Edgar Lee Hewett in 1896 and the results were published in 1904 (Hewett 1904). In 1916, Hewett helped establish Bandelier National Monument (BNM) as one of the first facilities in the region to protect outstanding archeological ruins (Steen 1977).

The School of American Archaeology conducted many field schools at BNM. However, no major reports resulted from these

excavations (Mathien et al. 1993 and Powers and Orcutt 1988). In 1935, the National Park Service (NPS) (which controlled the land on the Pajarito Plateau outside the BNM) produced a map of 200 sites on the Ramon Vigil Grant. Other material from the survey has been lost (Mathien et al. 1993).

Archaeological investigations on the Pajarito Plateau continued after World War II at BNM (Powers 1988, Caywood 1966, and Powers and Orcutt 1988), on the Los Alamos Scientific Laboratory (LASL) (Steen 1982, Worman 1967, and Worman and Steen 1978), and on privatized land in what is now the city of Los Alamos and the community of White Rock (Maxon 1969, Hill and Trierweiler 1986, and Kohler 1989). LASL hired archaeologist F.V. Worman in 1950, and since then, regular archaeological surveys and excavations have been made prior to all construction at LASL/ LANL (Mathien et al. 1993, LANL 1986–1995, Steen 1982).

LASL and LANL archaeologists have conducted hundreds of site excavations and surveys and have compiled and published numerous documents over the past 47 years. Although approximately 75 percent of LANL has been archaeologically surveyed (LANL 1995c), the number of cultural resources at LANL, the complexity of their cultural affiliations and types, and the manner in which they have been studied and recorded make systematic classification difficult. A cultural resources bibliography has been compiled for the Pajarito Plateau (Mathien et al. 1993). In addition, the resource records have been included in a relational database and many resurveys and refinements have been made to the original field data (PC 1996).

E.2.2 Studies of Historic Resources at LANL

Increased interest in the documentation and preservation of Nuclear Energy Period resources has come about since the end of the Cold War and publishing of the National Register of Historic Places (NRHP) guidance on the eligibility of resources less than 50 years old (U.S. Department of Defense [DOD] 1993 and NPS 1990). Citizens of Los Alamos County have supported historic preservation efforts that have focused on the legacy of the Manhattan Project. Survey work conducted in December of 1966 and 1968 resulted in the nomination for listing on the NRHP of the Los Alamos Historic District, including Ashley Pond, Fuller Lodge, Central Avenue LANL Administration Building, Los Alamos County Historical Museum and Archives, and other Manhattan Project properties outside the boundaries of LANL (NMHPD 1995).

While the potential significance of LANL as a site of outstanding importance in the development of nuclear energy is recognized by DOE, the State Historic Preservation Office(r) (SHPO), and the LANL Cultural Resources Management Team, comprehensive surveys have yet to be conducted for Nuclear Energy Period resources at LANL. A survey of 28 Cold War Period resources was conducted in 1995 by the LANL Cultural Resources Management Team prior to decontamination and decommissioning of buildings on the S-Site (TA–16), a critical area of high-explosive atomic research activity for the Manhattan Project. The results of this survey have been published as an Historic Building Survey Report (McGehee 1995). In the report, all 28 buildings were recommended as eligible for listing in the NRHP because of primary or secondary contributions to events of exceptional international importance. These buildings were also identified as contributing properties to a potential World War II and Cold War historic district at TA–16. According to McGehee, "A formal evaluation of the proposed district will be included in an overall evaluation and management document currently being drafted for all historic properties at LANL" (McGehee 1995).

E.2.3 Studies of Traditional Cultural Properties

Previously conducted TCP studies, identified during the course of this study, are summarized below. One problem encountered in compiling this review was a lack of comprehensive files available to researchers conducting ethnographic research in New Mexico. There is no central facility for ethnographic reports or lists of TCP sites.

In the past 5 years, as laws have changed to include protection of traditional places, several studies of TCPs have been conducted in central and northern New Mexico. In 1992, the Fence Lake Ethnographic Study was completed for the Salt River Project's proposed Fence Lake Mine in western New Mexico (Hart and Ferguson 1993). The Pueblos of Zuni and Acoma, the Hopi Tribe, and the Ramah Band of the Navajo Nation participated in this study. Information was collected through a literature study, meetings, and field work with the consulting tribes to document tribal use of the area as well as concerns revolving around proposed development. Several cultural resources significant to the consulting tribes were documented in or adjacent to the LANL region. These resources include the Zuni Salt Lake, the Zuni Salt Lake Neutral Zone, seven historic American Indian trails, numerous sacred places, ancestral homesites, ancestral graves and collection areas, prehistoric Pueblo ruins, and Cerro Prieto, a black volcanic cone. With the exception of the ancestral graves, most of these sites were recommended as eligible as a TCP for inclusion in the NRHP (Hart and Ferguson 1993).

A rapid ethnographic assessment of the Petroglyph National Monument was conducted in 1991 to 1992 to identify those American Indian tribes and Spanish heritage groups who were interested in participating in a long-term consultation process with the NPS concerning the management of the PNM (Evans et al. 1993). Once the groups were identified, cultural resource concerns were identified through letters and meetings with various tribal and Hispanic groups. Although specific cultural resource information was not made public, the consulting parties set forth several recommendations pertaining to management of the Petroglyph National Monument (Evans et al. 1993).

The Office of Contract Archeology at the University of New Mexico completed an ethnographic study of the Fort Wingate Depot Activity in 1994, as part of the closure process of the facility by the U.S. Army (Perlman 1995). The purpose of the study was to conduct a sample survey and an initial TCP assessment of sites located on the base that are of significance to the Navajo and Zuni people. This study was accomplished through a series of meetings and field work with the Church Rock, Iyanbito, and Bread Springs Chapters of the Navajo Nation and the Zuni Heritage and Historic Preservation Office. Through this TCP study and previous investigations, 24 cultural sites were identified, 15 of which were recommended for nomination to the NRHP as TCPs. Eight burials sites were identified and recommended as eligible for protection under the *Native American Graves Protection and Repatriation Act* (NAGPRA) (25 U.S.C. §3001).

American Indian concerns regarding traditional places in the Paseo del Volcan transportation corridor were documented in a study done in 1993 and 1994 as part of a project sponsored by the Federal Highway Administration and the New Mexico State Highway and Transportation Department (SWCA 1995). The purpose of the project was to identify a corridor that could be used to serve future transportation needs in the Albuquerque area. Nineteen New Mexico Pueblos, the Canoncito Navajo Chapter, the Hopi Tribe, and the Jicarilla and Mescalero Apache Tribes were initially contacted. Of this original group, ten expressed concerns about the project. Through a series of letters, meetings, and field work with these groups, concerns were

identified regarding traditional use of the project area. This was only a preliminary study, and no TCPs were identified by the consulting tribes. It became apparent during the study that unless a specific corridor was selected from the alternatives, the tribal consultants would not identify specific places of concerns (SWCA 1995). The Paseo del Volcan corridor study also identified three Hispanic TCPs in the Bernalillo area, including a historic neighborhood, the location of a religious fiesta that includes Matachines dances, and a pilgrimage route (SWCA 1996a).

Three TCP studies have been completed for the U.S. Bureau of Reclamation (Reclamation). In 1995, an initial TCP study was completed of Heron and El Vado Reservoirs in Rio Arriba County (SWCA 1996b). Initial contact letters were mailed to 11 tribes and 3 parish priests in the Chama area. In response to these letters, meetings were held with two of the tribes and one parish priest. The priest also participated in a field visit to the reservoirs. In response to these letters, meetings, and field visit, four Pueblos, the Jicarilla Apache Tribe, and Hispanic communities were identified as having concerns about the protection of potential cultural resources in the area of the two reservoirs (SWCA 1996a). As funding becomes available, a more intensive TCP study will be done for these two reservoirs.

In early 1996, an initial TCP study was completed at the White Ranch Property in Saguache County, in southern Colorado (SWCA 1996c). Contact was initiated with ten tribes in an effort to determine if these groups had concerns regarding the transfer of the White Ranch parcel from Reclamation to the U.S. Department of the Interior (DOI), U.S. Fish and Wildlife Service (FWS). Through this initial consultation, which included letters and meetings, five tribes indicated that they had concerns regarding cultural resources on the parcel. Two tribes requested field visits to the study area. As a result of this initial study, several recommendations were made, mainly in the form of further consultation and field visits with consulting tribes. Because this parcel is scheduled to be transferred to the FWS, it is anticipated that additional TCP investigations will be conducted (SWCA 1996c).

From 1992 through 1995, one of the more extensive TCP studies was conducted of the Animas-La Plata Project in southwestern Colorado and northwestern New Mexico (NAU and SWCA 1996). At the conclusion, 26 American Indian tribes had become involved in a complex consultation process involving contacts by letters, telephone calls, meetings, and field work. An extensive literature review also provided valuable information to the study. Through this study, TCPs and sacred places were identified, an assessment of the project impacts on these properties and places was made, and management recommendations were provided. The potential TCPs identified in the project area were a prehistoric/historic trail, puebloan habitation and ceremonial archaeological sites, and a traditional collections area (NAU and SWCA 1996).

In July 1995, an initial TCP study was conducted of the Westland Sector Plan Property in Bernalillo County (SWCA 1996d). The client and the city of Albuquerque Planning Department identified the groups to be contacted. These groups included one Pueblo, heirs and stockholders in the Westland Development Company, and two Hispanic community organizations. Consultation took the form of contact through letters, meetings, and interviews. The results of the literature review indicated the presence of various cultural resources on the West Mesa, with the heaviest incidence of use being within the boundaries of the Petroglyph National Monument. With the exception of one land rights organization, these groups did not have concerns regarding cultural resources located within the sector.

E.3 CULTURAL BACKGROUND OF THE LANL REGION

The following subsections contain a history and summaries of previous studies of the cultural background in the LANL region.

E.3.1 Prehistoric Background of the LANL Region

Previous archaeological investigations in the vicinity of the Pajarito Plateau indicate that the area has a history dating back many thousands of years. Researchers have developed socio-historical schemes to describe the cultural periods of the region (Kidder 1927). In 1954, Fred Wendorf defined five major periods for the northern Rio Grande Valley: Preceramic, Developmental, Coalition, Classic, and Historic (Wendorf 1954). These period classifications, with some modifications, are still in use (Pratt and Scurlock 1993). The Preceramic Period has been divided into Paleo-Indian and Archaic, based upon changes in settlement patterns and subsistence over time as reflected by material culture. The Historic Period includes both American Indian sites, where people abandoned their homelands and changed their ways of life in response to Euro-American and other influences, and sites that reflect the European and American settlement of the Rio Grande Valley. A summary of these periods is presented in Table E.3.1–1. Brief discussions of the highlights of each period follow.

E.3.1.1 *Paleo-Indian Period (10,000 Through 4000 B.C.)*

By the end of the Wisconsin glacial stage, 10,000 years ago, the entire area of the North American continent, including New Mexico, was occupied by people whose subsistence was based on hunting and gathering (Willey 1966). Archaeological sites dating from this period contain bones of mammoths and bison and distinctive lanceolate projectile points, in association with a variety of stone butchering tools and lithic debitage. Paleo-Indian artifacts made of obsidian from the Jemez Mountains have been found in other parts of the Southwest (Broster 1983). Obsidian deposits were exposed in ancient landslides at higher elevations and around the margins of Valle Grande to the northwest (Powers 1988). Sites of the Paleo-Indian Period may be found in any part of LANL; however, no discoveries of Paleo-Indian remains have been made (Wolfman 1994 and LANL 1995c). Paleo-Indian materials have been reported near Cochiti; however, these were confined to surface finds of projectile points and lithic debitage (Biella 1977, Biella and Chapman 1977–1979). Because any information concerning the Paleo-Indian Period would contribute to the development of the historical context, all sites of this period are likely to be significant.

E.3.1.2 *Archaic Period (4000 B.C. Through A.D. 600)*

American Indians altered their lifestyles in response to a continuing shift of the climate toward present-day conditions at the end of the Pleistocene Period. By this period, the big game of the Pleistocene era had died out and a heavier reliance was placed on hunting and gathering. Although bison hunting continued to be important (Stuart and Gauthier 1981), small game such as deer, raccoon, turkey, and squirrel became an increasingly significant component of the diet (Larson 1991). Group movements became tied to the seasonal availability of plants. This change in subsistence was accompanied by a change in the tool assemblage, with broad-stemmed projectile points, stone knives, fish hooks, jewelry, and grinding stones becoming common. Archaic Period sites include cave and rock shelter sites, burned rock features, scatters of tools and lithic debitage, and isolated hearths. On the Pajarito Plateau, Archaic Period sites are most likely to

TABLE E.3.1–1.—*Archaeological Periods of Northern New Mexico*

TIME PERIOD	PREHISTORIC PERIOD	CHARACTERISTIC SITE TYPES
10,000 through 4000 B.C.	Paleo-Indian	• Bones of mammoth or bison • Stone butchering tools • Flakes and chips of stones from making stone tools • Distinctive lance-shaped projective points
4000 B.C. through A.D. 600	Archaic	• Caves and rock shelters • Burned rock features • Scatters of tools and stone flakes and chips • Isolated hearths • End of the Archaic period (approximately A.D. 1 to 700) may have pottery grinding stones, and charred corn
A.D. 600 through 1100	Developmental	• Ceramic storage and service vessels • Smaller projectile points reflecting the adoption of the bow and arrow • Grinding tools • Dwellings increased in size and complexity from semisubterranean pithouses to small adobe or crude masonry structures
A.D. 1100 through 1325	Coalition	• Early sites are rectangular structures of adobe and masonry with basin-shaped, abobe-lines fire pits, usually in the center of the room or against a wall • Comparatively small; pueblos average 28 rooms • Later coalition sites contain plazas and room blocks of more than 100 rooms
A.D. 1325 through 1600	Classic	• Large masonry structures of multiple-room blocks • For the Pajarito Plateau, three site clusters, one of which includes Navawi, Otowi, Tsankawi, and Tsirege • Associated one- to two-room isolated structures

Sources: Cordell 1979, Cordell 1984, LANL 1995c, Stuart and Gautheir 1981, Wendorf 1954, and Wolfman 1994.

be represented by concentrations of lithic debitage.

E.3.1.3 *Developmental Period (A.D. 600 Through 1100)*

About A.D. 600, the prehistoric occupants shifted their subsistence and settlement patterns toward a more sedentary lifestyle and intensified horticultural practices (Powers 1988), including the cultivation of maize, beans, and squash. In the LANL region, the Developmental Period has been subdivided into early and late phases (Wolfman 1994). These subdivisions appear to reflect observable trends in increased sedentary behavior and social complexity. Additional attributes of the Developmental Period include the advent of ceramic storage and service vessels, smaller projectile points, the adoption of the bow and arrow, continued use of grinding tools, and increases in size and complexity of houses. During the Early Developmental Period (A.D. 600 through 900), single family units were built in semi-subterranean pit houses. Late Developmental Period sites (A.D. 900 through 1099) were typically small adobe or crude masonry structures. Although they are scarce

on the Pajarito Plateau (Wolfman 1994), sites attributable to the Developmental Period have been identified at LANL.

E.3.1.4 *Coalition Period (A.D. 1100 Through 1325)*

During the Coalition Period, the local populations coalesced into larger societal units. Subsistence was based on maize horticulture. The early sites are rectangular structures of adobe and masonry. Basin-shaped, adobe-lined fire pits are usually in the centers of the rooms, or sometimes against a wall. Circular or D-shaped semi-subterranean kivas are often in front of the room blocks (Larson 1991). Fairly small Pueblos, averaging 28 rooms, were typical of the Coalition Period (Wolfman 1994), although late Coalition Period sites are large masonry structures exhibiting plazas and room blocks of over 100 rooms (LANL 1995c). Over 700 Coalition Period ruins have been found within LANL boundaries.

E.3.1.5 *Classic Period (A.D. 1325 Through 1600)*

During the Classic Period, maize-based horticulture intensified and settlements on the Pajarito Plateau further coalesced into three main population centers. One of these site clusters consists of four sites that temporally overlapped: Navawi, Otowi, Tsankawi, and Tsirege (LANL 1995c). These sites are large masonry structures of multiple room blocks, with associated one- or two-room isolated structures. Otowi and Tsirege appear to be the ancestral sites of the Pueblo of San Ildefonso. Severe droughts in the 1500's led to abandonment of many of the Pueblos and the Pajarito Plateau. The scarcity of water and crop failures probably forced gradual relocations to more reliable water sources in the Rio Grande Valley (Sando 1992). Tree-ring dating (dendrochronology) from the Frijoles Canyon Pueblos indicates that the last roof beams were cut around 1550 (Robinson et al. 1972). The exodus probably took place over many years. At the time of the Spanish arrival in 1597, most activity had ended on the Pajarito Plateau and four Pueblos were established in the adjoining Rio Grande Valley: the Pueblos of Santa Clara, Jemez, San Ildefonso, and Cochiti.

E.3.2 Historic Background of the LANL Region

This subsection presents highlights of historic events that occurred in the LANL region.

E.3.2.1 *Spanish Colonial Period (A.D. 1600 Through 1849)*

The inhabitants of the Rio Grande Pueblos still remember their ancestral homes on the Pajarito Plateau at the time of the Spanish Conquest (Hewett and Dutton 1945). There is archaeological evidence that the abandoned canyons with their Pueblos and caves were visited for ceremonial purposes. Pictographs of horse figures exist in some kiva ruins at BNM and on canyon walls in White Rock Canyon (Kessell 1979). These may indicate that the area was occupied by a small remnant population after the Spanish occupation of the Rio Grande Valley. Game pits on the Pajarito Plateau could also date from the time of the Spanish occupation or later. The use of the area from that time forward seems to have been for occasional hunting and gathering or ceremonial use, including burials (Steen 1977). American Indian sites relating to this early Historic Period are classified as historic sites.

The Coronado expedition entered the region of the Rio Grande Pueblos in 1540. Hernando de Alvarado and his commander, Francisco Coronado, waged intermittent battles with individual Pueblos for food and supplies (Kessell 1979). The Spanish did not meet with much success in New Mexico and retreated to Mexico in April 1542 (Jenkins and Schroeder

1974). The 1598 expedition by Juan de Oñate arrived in Northern New Mexico with strong military backing, livestock, and equipment for full colonization. The Pueblos of the Rio Grande Valley continued to shrink in size during this 50-year interlude, and some locations inhabited when Coronado first entered the Valley were no longer occupied when Oñate arrived (Schroeder 1979). Pueblo leaders voluntarily took oaths of allegiance to the Spanish Crown and accepted the Franciscans who took up residence in each Pueblo. Churches were added to each Pueblo early in the seventeenth century (Simmons 1979a).

In 1610, the Spanish capital of New Mexico was relocated to Santa Fe by Governor Pedro de Peralta (Kessell 1979). The extensive Palace of the Governors was built to serve the administration of New Mexico as the settlement of the area continued (Kessell 1979). This Spanish Colonial Period was not peaceful, and the Pueblos were beset by incursions from the Spanish settlers, epidemics of smallpox and other deadly diseases, and continual attacks by Apaches (Simmons 1979a). In 1680, the Pueblos openly revolted against Spanish rule, attacking the Spanish settlers and Franciscans in the Rio Grande Valley and laying siege to the Palace of the Governors in Santa Fe. The Spanish Governor, Otermin, and most other Spanish settlers were forced south to El Paso (Hendricks 1993). American Indian governors ruled New Mexico from the Palace of the Governors for 12 years, until 1693 when Spanish control was reestablished. In 1821, the Spanish population in New Mexico had reached 20,000 to 25,000 (Simmons 1979b).

In the late seventeenth century, the Spanish Crown provided land grants adjoining the Pajarito Plateau to four Pueblos in New Mexico (Brayer 1938). The Jemez Pueblo was originally granted 17,331 acres (7,014 hectares) in 1689. Pueblo de Cochiti was granted over 20,000 acres (8,094 hectares); Santa Clara Pueblo was granted 44,818 acres (18,138 hectares); and San Ildefonso Pueblo was granted 15,413 acres (6,237 hectares) during this period (Simmons 1979a). American Indian populations continued to decline from disease during the Spanish occupation. The Pueblos surrounding the Pajarito Plateau suffered tremendous population losses. According to published records of the Spanish census of New Mexico, population totals fell from a combined 6,400 in Jemez, San Ildefonso, Santo Domingo, Santa Clara, and Cochiti Pueblos in 1630 to 1,374 in 1821 (Simmons 1979b).

Mexico was granted independence from Spain with the signing of the Treaty of Córdova in 1821. The treaty granted full Mexican citizenship to all American Indians (Kessell 1979). The quarter-century of Mexican administration in New Mexico was not marked by any major changes in the legal or cultural affairs of the state. However, it did open up major new trade routes and commerce between Santa Fe and the U.S. By 1824, New Mexicans were, for the first time, buying more from U.S. merchants than from their traditional Chihuahuan sources, and the Santa Fe Trail became important for U.S. traders selling goods to Mexico (Jenkins and Schroeder 1974).

Use of the Pajarito Plateau during the Spanish Colonial and Territorial Periods is not well documented (LANL 1995c). Grazing, seasonal gathering of firewood and timber, and hunting were probably practiced by the growing Hispanic population and by the nearby American Indian communities.

E.3.2.2 *Early U.S. Territorial/ Statehood Period (A.D. 1849 Through 1942)*

U.S. Army General Stephen Watts Kearny occupied New Mexico when the Mexican War broke out in 1846. The Pueblos of the Rio Grande Valley and the rural Spanish culture of northern New Mexico had become accustomed to changing political authority in Santa Fe and

generally did not resist the change in power. However, in 1847, a rebellion broke out at Taos Pueblo. The brief revolt was bloody and rapidly put down by the U.S. Army (Jenkins and Schroeder 1974). The Treaty of Guadalupe-Hidalgo (1849) formally ended the question of authority in New Mexico and the new administration soon took effect. U.S. policy toward American Indians, including lands and citizenship, was very different from that of Spanish or Mexican administrators. The cornerstones of U.S. American Indian relations were isolation of tribes into separate reservation lands and provision of military protection and education. The first American Indian agent was assigned to New Mexico in 1849, as part of the territorial administration. In the shaping of the first steps toward statehood, the original Spanish and Mexican land grants in New Mexico were formally recognized (Leonard 1970 and Carlson 1990).

The early U.S. homesteaders may have informally begun using the Pajarito Plateau shortly after the U.S. Territory was established by the *Homestead Act of 1862*, which officially opened any untitled lands in New Mexico to settlement. By 1890, the Pajarito Plateau was still only sparsely settled by Hispanic and Anglo homestead ranches (Seidel 1995). The remains of these homesteads usually consist of wooden cabins, corrals, rock and cement cisterns, and agricultural debris such as barbed wire, wagon parts, horseshoes, and other evidence of livestock raising and transportation methods.

Since 1900, the remote and scenic location of the Pajarito Plateau has attracted outdoorsmen for hunting and fishing. The Jemez Mountains and antiquities of the Pajarito Plateau brought many visitors to the area once BNM was established in 1916 (Seidel 1995). The present site of Los Alamos was purchased in 1917 by Ashley Pond. In 1918, Pond established the Los Alamos Ranch School, a private boys' school. The school specialized in residential secondary education and attracted many young men from wealthy eastern families seeking robust physical development as well as academic education (Seidel 1995). The main recreation lodge and dining hall of the school, Fuller Lodge, is now part of a National Historic District and is a registered national historic landmark. The lodge, built in 1928, is constructed of logs and was designed by John Gaw Meem. The school operated from 1918 until 1943, when the facilities were acquired by the U.S. government for the Manhattan Project (Seidel 1995).

E.3.2.3 *Nuclear Energy Period (A.D. 1943 to Present)*

Because of very well-defined changes in the function of LASL/LANL, the Nuclear Energy Period is further broken into three periods: World War II/Early Nuclear Weapon Development, Early Cold War, and Late Cold War.

World War II/Early Nuclear Weapon Development Period (A.D. 1943 Through 1948)

The latest era in the historic development of the LANL region began in 1943 with the purchase of the Los Alamos Ranch School by the Secretary of War, as part of the wartime effort to build a secret nuclear weapons program (Seidel 1995). LASL was involved from the very inception of the U.S. government's program to develop nuclear weapons for the war effort (Truslow 1991). LASL was not only representative of wartime research and development facilities, but it provided innovative scientific and technological research and development activities for the U.S. nuclear weapons program from 1943 until the end of the Cold War in 1989. Los Alamos was the original site selected for the design and construction of the first nuclear bomb because of its remote and secret location (Truslow 1991).

The Los Alamos Early Nuclear Weapon Development Period facilities at LASL were built and used in the creation of the first atomic

bomb, which was detonated successfully in July 1945. The design and manufacture of the Trinity bomb; the Hiroshima bomb, Little Boy; and the Nagasaki bomb, Fat Man; took place at LASL (Truslow 1991). LASL and the Trinity Test Site near Alamogordo, New Mexico, represent World War II nuclear weapon development events of exceptional importance on an international scale.

World War II research and development activities were concentrated around the Los Alamos Boys Ranch School, which became the living center for scientists during the war. Laboratories were erected at more remote locations. The S-Site, for example, was developed for high explosives research (Truslow 1991). This set a pattern for later development at LASL, where housing and administration remained concentrated around the present Los Alamos townsite and the former site of the Los Alamos Boys Ranch School. A back gate was erected to control access to the remote laboratories of the S- and V-Sites (Truslow 1991). From 1946 through 1950, all nuclear weapons were made at Los Alamos (DOE 1995). Common remains from this period and the following Early Cold War Period consist of laboratory and administration buildings, security facilities, experimental areas, infrastructure support facilities, berms and barricades, and paved and unpaved roads.

Early Cold War Period (A.D. 1949 Through 1956)

The mission of nuclear weapons development did not end with the close of World War II. In 1946, the Atomic Energy Commission (AEC) became the administrator of LASL, and nuclear weapons research and development continued (Seidel 1995). The Early Cold War Period began when the Union of Soviet Socialist Republics (U.S.S.R.) exploded its first atomic bomb in 1949 and the U.S. government became dedicated to nuclear weapons development and production in a nuclear arms race (LaFeber 1993). The Early Cold War Period was characterized by international tensions, armament buildup, and mostly military conflict by proxy waged in remote areas of the developing world.

LASL was the first, and later, one of only 13 sites in the U.S. devoted to nuclear weapons development and production (Seidel 1995). During the Early Cold War, LASL became a primary research and development center for U.S. nuclear programs, while production was shifted to other facilities. The period from 1949 to 1956 brought a considerable amount of new construction to LASL to meet the research needs of rapid nuclear armament buildup and international tensions between the U.S. and the U.S.S.R.

From 1943 until 1957, the entire Pajarito Plateau was shielded from public access. Los Alamos was closed and the mission and activities at LASL were classified (Seidel 1995). The city had grown to approximately 5,000 scientists and their families by 1945. In 1941, Los Alamos County was partitioned from Sandoval County and Santa Fe County, with the AEC controlling nearly all acreage in the new county (Seidel 1995).

Late Cold War Period (A.D. 1957 Through 1989)

In 1957, parts of the Pajarito Plateau, including the Los Alamos townsite, were opened to the public, marking the beginning of the Late Cold War (Seidel 1995). Throughout the Cold War, the LASL mission continued to be one of innovation and the scientific development of more powerful and efficient nuclear weapons and delivery systems. The Late Cold War was marked by more diversified research goals. Several periods of construction have occurred at LASL since 1956, but have yet to be analyzed. In 1977, the present boundaries were established, the name was changed to LANL (Steen 1977), and management of LANL was awarded to the University of California (UC) (Seidel 1995).

The international events that may be reflected in the physical record at LANL during this period include (DOD 1993):

- *1957*. First underground nuclear test, first intercontinental ballistic missile (ICBM) developed, first successful test of Atlas missiles.
- *1958*. First Nike-Hercules missile.
- *1961*. U.S. resumes underground testing of nuclear weapons; U.S.S.R. resumes atmospheric testing.
- *1962*. East-West conference on banning nuclear weapons tests takes place; U.S. resumes atmospheric testing of nuclear weapons.
- *1967*. Treaty of Tlatelcoco prohibits introduction and manufacture of nuclear weapons in Latin America (signed by all Latin American countries except Cuba).
- *1968*. Nuclear Arms Non-proliferation Treaty signed by U.S., U.S.S.R., and 58 other nations.
- *1970*. Nuclear Arms Non-proliferation Treaty goes into effect.
- *1976*. U.S. and U.S.S.R. sign peaceful nuclear explosions treaty limiting testing.
- *1979*. North Atlantic Treaty Organization (NATO) announces "dual-track" intermediate-range nuclear forces to intercept Warsaw Pact SS-20 missiles.
- *1983*. Congress authorizes MX missile procurement and development; Scowcroft Commission calls for modernizing U.S. strategic weapons.
- *1985*. Nuclear and space talks open in Geneva.
- *1986*. Peacekeeper ICBM becomes operational.
- *1987*. U.S. and U.S.S.R. sign Nuclear Risk Reduction Agreement, eliminating intermediate range nuclear weapons.
- *1989*. Fall of the Berlin Wall.
- *1991*. Presidents Bush and Gorbachev sign Strategic Arms Reduction Treaty (START); dissolution of the Warsaw Pact.

LANL's nuclear mission continued to be the primary focus of Los Alamos County until the end of the Cold War in 1989, creating a uniquely specialized scientific community in this remote region of New Mexico. The fall of the Berlin Wall in 1989 and the dissolution of the Warsaw Pact in 1991 effectively ended the international tensions that drove the nuclear development mission at LANL (DOD 1993).

E.3.3 Traditional Cultural Background in the LANL Region

A TCP is a significant place or object associated with historical and cultural practices or beliefs of a living community that is rooted in that community's history and is important in maintaining the continuing cultural identity of the community (Parker and King 1990). TCPs are essential in preserving cultural identity through social, spiritual, political, and economic uses. Federal guidelines established by the NPS (Parker and King 1990) identify TCPs to include

- Natural resources.
- Prehistoric and historic archaeological sites.
- Traditional use areas in the cultural landscape that do not reveal evidence of human use.
- Rural communities whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents.
- An urban neighborhood that is the traditional home of a particular cultural group and that reflects its beliefs and practices.
- A location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historical identity.

For TCPs on other lands, tribal rights have been established in the federal decision-making

process. SWEIS consultations have been conducted in accordance with applicable federal requirements to include NHPA (16 U.S.C. §470), NAGPRA, *American Indian Religious Freedom Act* (AIRFA) (42 U.S.C. §1996; EO 13007), and DOE and LANL Accord Agreements with the Pueblo de Cochiti and the Pueblos of Jemez, Santa Clara, and San Ildefonso (DOE et al. 1992).

TCPs are not limited to ethnic minority groups, and traditional cultural contexts of northern New Mexico include cultural groups other than American Indians. Americans of every ethnic origin have properties to which they ascribe traditional cultural value. The Hispanic culture, in particular, has maintained traditional communities, practices, beliefs, and subsistence patterns in northern New Mexico.

E.3.3.1 *American Indian Cultures in the LANL Region*

The diversity of American Indian traditional cultural practices in the Southwest is reflected in the number of languages and complex cultures that occur there. Language is essential to the preservation of these cultural practices.

There are five different language families in the LANL region: Tanoan, Keres, Zuni, Uto-Aztecan, and Athabaskan (Hale and Harris 1979). These languages are presented in Table E.3.3.1–1 to show the relationships among the American Indian communities that speak each of the languages. The diversity of the languages also illustrates the complexity of multicultural relations in the region.

Every recognized American Indian community is a sovereign nation with limited powers. In accordance with the DOE American Indian

TABLE E.3.3.1–1.—*Languages of American Indian Communities within the LANL Region*

LANGUAGE FAMILY	SUBFAMILIES	COMMUNITIES THAT SPEAK THE LANGUAGE	
Tanoan	Tiwa (Northern and Southern dialects)	Pueblo of Taos Pueblo of Picuris	Pueblo of Sandia Pueblo of Isleta
	Tewa	Pueblo of San Juan Pueblo of Santa Clara Pueblo of San Ildefonso	Pueblo of Pojoaque Pueblo of Nambe Pueblo of Tesuque Arizona-Tewa
	Towa	Pueblo of Jemez	
Keres	(Eastern and Western dialects)	Pueblo de Cochiti Pueblo of Santo Domingo	Pueblo of Santa Ana Pueblo of San Felipe Pueblo of Zia
Zuni		Pueblo of Zuni	
Uto-Aztecan	Shoshonean	Hopi Tribe (Several villages on the First, Second, and Third Mesas, Arizona)	
Southern Athabascan	Eastern Apache	Jicarilla Apache Tribe	Mescalero Apache Tribe
	Western Apache	Navajo Nation (Navajo language)	

Source: Hale and Harris 1979.

Policy, DOE interacts with federally recognized tribes on a government-to-government basis (DOE 1994). In 1992, DOE and the Pueblos of San Ildefonso, Santa Clara, Cochiti, and Jemez, which are located near or directly adjacent to LANL, entered into formal agreements called Accords. The purpose of the Accords was to improve communication and cooperation among federal and tribal governments. In 1994 and in 1996, the Pueblos of San Ildefonso, Cochiti, Jemez, and Santa Clara also signed cooperative agreements with DOE and UC to promote a meaningful participation and consultation on Pueblo environment, safety, health, and religious-culturally significant matters. The Accords and cooperative agreements are discussed further in chapter 7, section 7.2.9.

In Apache and Navajo communities (Athabascan cultures), tribal governments are based on the electoral process. Tribal members select a president and vice president during the summer for a 4-year term of office. The Navajo Nation has 110 political subdivisions, called "Chapter Houses" (e.g., Alamo, Cañoncito), that are represented in the Council. Initially, federal agencies must consult with the President of the Navajo Nation directly, but later requests may be referred to specific tribal departments or chapters.

The role of tribal governments is to interact with outside organizations such as county, state, and federal bureaucracies on a variety of issues. These issues include casinos and economic development, litigation, tribal court systems, land claims, hazardous waste transportation through tribal lands, construction projects compliance with tribal environmental standards, Indian health clinics, grave repatriation issues, language preservation programs, and cultural resources management.

E.3.3.2 *Traditional Hispanic Communities in the LANL Region*

LANL is located near numerous traditional Hispanic communities in four counties: Santa Fe, Sandoval, Rio Arriba, and Taos. While many of the cultural characteristics and demographics of the larger towns and cities of northern New Mexico have changed in recent years, many small, rural, and primarily Spanish-speaking communities, identified as traditional communities, continue to exist. Many communities were first settled during the Spanish Colonial Period and were given their land by the Spanish Crown (Weigle 1978). The identity of traditional Hispanic communities is maintained partly through archaic linguistic patterns and vocabulary carried over from early Spanish colonization of the area and partly through the traditional beliefs and practices unique to the region. Traditional Hispanic communities in northern New Mexico also maintain religious practices, art and craft traditions, folklore, and traditional medical practices (Ahlborn 1968, Briggs 1980, Weigle 1978, and Carlson 1990).

A traditional element present in these communities is the use of shared community ditches, or acequias, for irrigation (Carlson 1990). For that reason, these communities are sometimes known as acequia communities. (Campa 1979). Acequias are not only ditches but also traditional cultural systems that organize allocating, distributing, and sharing water in an arid land. Acequia systems are governed by traditional practices that are derived from Spanish Colonial laws of the seventeenth and eighteenth centuries (Weigle 1978 and Carlson 1990). The social labor systems necessary to operate the ditches include commissioners (elected representatives), mayordomos/mayordomas (ditch managers), and parcipiantes (landowners/shareholders) (Meyer 1984). Acequias are also political subdivisions of the State of New Mexico,

recognized for their role in the development and administration of water resources for irrigation. The acequia system in the region is also closely intertwined with the Catholic Church.

E.3.3.3 *Traditional Cultural Property Categories*

Because of the numerous traditional cultures present in the region, the discussion of TCPs will be based on resource categories as well as the particular cultural affiliation of the community. The traditional cultures of the region have had many generations of interaction with one another and often have overlapping subsistence, artistic, and religious practices with unique cultural importance attached to similar types of sites. Several general categories of TCPs have been identified in the literature on American Indian and Hispanic cultures in northern New Mexico. Each of these categories represents specific cultural and physical sensitivity and susceptibility to adverse impacts from LANL operations. TCP resource types or categories in northern New Mexico include:

- Ceremonial and archaeological sites
- Natural features mentioned in stories, myths, and legends
- Ethnobotanical plant-gathering sites
- Artisan material-gathering sites
- Places used in traditional subsistence activities

These resource types are described in the following subsections, providing an overview of the range and diversity of potential TCPs in northern New Mexico.

Ceremonial and Archaeological Sites

Religious and ceremonial sites may be TCPs if they are still a part of the living memory and practices of traditional communities. Both American Indian and Hispanic communities have many ceremonial sites in northern New Mexico, including American Indian shrines and places of ceremony, Hispanic shrines, sanctuaries and meeting houses of the Catholic lay-brotherhood, known as Los Hermanos Penitentes.

American Indian groups visit and use a variety of ceremonial sites and shrines that are part of the landscape. The locations of tribal ceremonial sites and shrines are often held in secret by religious societies in the Pueblos (Starr 1900). Some American Indian ceremonial sites are marked with stones or other man-made features, while others are preserved in the living memory of the societies that visit them (Harrington 1916 and Douglas 1917). Some sites are visited only on rare occasions as particular circumstances demand it (Lange 1959 and Nordhaus 1995). The locations of some shrines have been previously published, but in the interest of preserving the privacy of the tribes, only general locations have been indicated throughout this technical report.

Most American Indian ceremonial sites remain unrecorded. Examples of recorded American Indian ceremonial sites within or near LANL boundaries include shrines that are known to exist around Mount Pelado, Redondo Peak (Akins 1993 and Ellis 1979); around Ovahwi Peak, Capulin Canyon, and Black Mesa (Akins 1993, Harrington 1916, and Douglas 1917); and along the Rio Grande, Tsikomo Peak, Nipple Mountain, Potrero de los Idolos, Peña Blanca, and Canada de Peralta. Shrines are also recorded for several caves in the area (Akins 1993, Harrington 1916, and Lange 1959).

Sanctuaries, shrines, and religious structures dating from the Colonial Period in New Mexico, are still widely revered and used by traditional communities, both Hispanic and American Indian. These sanctuaries may be completely ruined at this time or may have been extensively restored. The Santuario de Chimayo is widely visited by pilgrims from traditional Hispanic villages around New Mexico (Treib 1993). Sanctuaries at Cochiti, Santa Domingo, San Felipe, Zia, and Picuris Pueblos are enduring

locations of traditional ceremonial practice (Treib 1993). The Oratorio of San Ysidro, the sanctuary of San Vicente De Paul in Punta de Agua, the church of San Miguel in La Bajada, and the church of San Jose de Gracia de Las Trampas are other examples of important Hispanic sanctuaries (Treib 1993). The ruins of San Jose de Giusewa in Jemez Springs are no longer in use as a sanctuary, but remain part of the continuing Catholic traditions of the Jemez Valley.

Moradas are ceremonial features unique to the Spanish traditions of northern New Mexico (Ahlborn 1968 and Wallis 1994). These structures serve as chapter houses for the lay-brotherhood of La Fraternidad Piadosa de Nuestro Padre Jesus Nazareno, also known as Los Hermanos Penitentes (Wallis 1994). Los Hermanos Penitentes originated in Spanish Colonial New Mexico and were formally organized between 1776 and 1833 during a period when there were insufficient priests to serve the needs of the Hispanic communities. The village moradas still serve to bring the traditional Hispanic community together and preserve teaching and values unique to the region through their community meetings, teachings, and ceremonies (Ahlborn 1968 and Wallis 1994).

Community members who move away for work often return for annual ceremonials that provide continuing identity with their Spanish ancestors. One Penitente writes,

> I am a member in good standing in the Brotherhood as were my forefathers, yet as is true of many Brothers of my generation, I no longer live in the village of my ancestors. Still I always return to the Morada. The Morada is a symbol of continuity, a reminder that those who went before us made many sacrifices to maintain something for succeeding generations (Wallis 1994).

Ancestral villages, archaeological sites, and petroglyphs, so numerous in the LANL region, are considered sacred areas by American Indian tribes. Pueblo de Cochiti inhabitants, for example, have many stories about their ancestors and the ruins in the region. Their stories indicate that originally all their people came up from Shipap (an unknown place of great antiquity) and lived together on the Mesa of the Stone Lions (Frijoles Canyon) in different villages: White House and the Village of the Two Lions (Benedict 1931, Akins 1993, and Douglas 1917). Then, the people split apart and the Santo Domingo went down the east bank of the Rio Grande to Cactus Village while the people of San Felipe, Laguna, and Acoma traveled west, down Peralta Canyon, and built the Pueblo of Peralta Canyon (Benedict 1931, Lange 1959, and Akins 1993). At the same time, the people of Cochiti went down Kapolin Canyon to settle in San Miguel on the west side of the river. Hainayasta and Tiputse are mentioned as Cochiti villages "across the river." Later the Pueblo de Cochiti people came from San Miguel to the "Plateau of the Buildings" where a new Pueblo was built. They lived there many years before coming down from the plateau (Benedict 1931 and Akins 1993).

Each of the physical places mentioned in such legends is a sacred link between the traditional community and the lives and traditional ways of their ancestors. The importance of ancestral villages is often reinforced by ceremonies held at ancestral ruins (Douglas 1917 and Akins 1993).

Natural Features

A variety of features in the landscape have special meaning for traditional cultures of northern New Mexico because of their association with the stories, myths, and legends that are shared by the community. Sites in this category may not need to be visited on a regular basis to retain cultural value and, in fact, may be inaccessible. The cultural value derives from the knowledge of their existence in relation to

the ongoing history and values of the community.

Some natural features may resemble an animal, person, or mythological creature, and traditional stories may explain their existence and relationship to the traditional culture. Examples of this resource category include Camel Rock on Pueblo of Tesuque tribal lands and Black Mesa on Pueblo of San Ildefonso tribal lands. Black Mesa is known in stories as the home of Tsah-ve-yoh, a dreaded child-eating giant from Tewa stories, who returns to the surrounding Pueblos every year at Christmas time to whip any bad children who do not behave (DeHuff 1931). The same feature is also known from Tewa legends as a stronghold to which the people fled during the Navajo siege of ancient times and again when the Tewa were besieged by the Spaniards in 1694 (DeHuff 1931). Black Mesa does not have to be visited to maintain cultural value for the communities; its visibility is a daily reminder to children of the need to be obedient members of the Pueblo and of the bravery of their ancestors. Camel Rock, along U.S. Highway 84 between Santa Fe and Pojoaque Pueblo, is likewise a TCP that is mentioned in stories of the Tsah-ve-yoh. It is told that the giant would take four long strides from Black Mesa to Pojoaque to grab up the children of the Pueblo, then sit down on the rock formation (Camel Rock) to eat them alive (DeHuff 1931).

Stories and myths of Pueblo de Cochiti mention other prominent natural features: "Cave Place" and Peralta Canyon are mentioned in stories as places where giants lived. The giants are known to carry Cochiti children from the old Pueblo at Hainaysta (across the river from the modern Pueblo) through "Fissure Place" and to the "Giants Boiling Place." One giant, Schkoio schkaka haush, is known in myths to have been killed and shut up in his cave (Benedict 1931). Another natural feature is the "Stone Lions," a stone carved to resemble two resting lions, which gives the name "Village of Stone Lions" to an ancient Pueblo on the mesa above Frijoles Canyon (Hendron 1946 and Benedict 1931).

Mountain peaks, lakes, springs, and petroglyphs are often natural features in the sacred legends of traditional cultures in northern New Mexico (Akins 1993). Sacred peaks are part of the iconography of the Navajo Nation and of the Jicarilla Apache Tribe (Nordhaus 1995). Peaks sacred to the Tewa tribes include Conjilon, Chicoma Mountain, Sandia Crest, Truchas Peak (Friedlander and Pinyan 1980), San Antonio Peak, Lake Peak, and Cerro Pelado (Hewett and Dutton 1945). Sandia Pueblo considers Puye National Monument pictographs to be sacred to the tribe (Parker 1993). Hewett and Dutton reported in 1945 that the San Ildefonso and other Pueblos hold five area lakes and springs to be sacred (Hewett and Dutton 1945). These springs and lakes mark the four directions around San Ildefonso.

Ethnobotanical Gathering Sites

American Indian and traditional Hispanic communities rely on the use of wild native plants for ceremonial and medicinal purposes such as foods, dyes, and utilitarian objects (Dunmire and Tierney 1995, Robbins et al. 1916, and Toll 1992). Through the everyday use of native plants, there is a sense of connection with the land and continuity with the previous generations who were part of the land (Ford 1976, Cajete 1994, and Wetterstrom 1986). The continued use of botanicals in traditional cultures confirms a body of unwritten knowledge about the values and purposes of plants as part of a particular world-view or belief system unique to each culture (Wetterstrom 1986 and Toll 1992). This subsection contains information regarding plants that are ingested or used for ceremonial purposes. Plants used for dyes, construction, and other utilitarian purposes will be discussed as artisan materials in the following subsection.

American Indian ceremonies make use of specific wild plants and cultivated plants as

foods, beverages, smoke, and coloring agents, or for ritual chewing. They are also incorporated into ceremonial implements or objects (Hiles 1992, Moerman 1986, and Dunmire and Tierney 1995). One such example of ceremonial use occurs each year at Sandia Pueblo when bundles of wood and snakeweed are taken to the cacique or Pueblo leader. This is done for 12 days following the winter solstice in ceremonies to nurture and bless the village (Dunmire and Tierney 1995). The use of smudges of big sage is recorded from Jemez Pueblo and the Navajo Nation for fumigating and purifying houses (Young 1940 and Dunmire and Tierney 1995). Douglas fir boughs and branches are incorporated into the traditional dances of several Rio Grande Pueblos (Dunmire and Tierney 1995), and cattails are also frequently featured in Pueblo ceremonies because of their symbolic association with water (Ford 1968 and Robbins et al. 1916). Navajo ceremonies use several plants such as bitterball and ironwood (Young 1940 and Elmore 1944). Ceremonial use of plants may require that they be gathered from specific places in order to increase their potency or ritual significance (Ford 1968). Pueblo practices may require ritualized gathering of medicinal plants and wild foods or may be undertaken only by certain sodalities (Ford 1968).

It is uncertain from the literature if there are Hispanic ritual or ceremonial uses for plants. Knowledge about the use of native food plants was undoubtedly shared among the Pueblo cultures and the Spanish colonists, for Hispanic knowledge and use of native plants for food and medicine overlaps a great deal with Pueblo uses. Pueblo uses of wild plants also seem to have been altered by Spanish contact (Toll 1992 and Ford 1968).

The Rio Grande Pueblo people gather many wild plants as foods and beverages (Dunmire and Tierney 1995). Documented food use includes three-leafed sumac, acorns from Gambel's oak, and ripe fruit from the chokecherry, gooseberry, and currant. Since ancient times, the fleshy fruit of the banana yucca has continuously been harvested and used as food by Pueblo people (Minnis 1991, Ford 1968, Toll 1983, and Toll 1992). The use of Indian tea is also very common as a beverage among Pueblo, Navajo, Apache, and Hispanic people in the region (Dunmire and Tierney 1995, Moerman 1986, and Elmore 1944). Prickly pear fruit, Indian rice grass seeds, and tubers of wild potato are believed to have been important "famine foods" of the region in past times of drought and may still be gathered and encouraged to grow near Pueblos (Minnis 1991). Pinyon nuts are the most important of all wild food sources for Pueblos and traditional Hispanic communities in the region. Families will frequently travel great distances to collect nuts in the autumn, and individuals may gather and sell the nuts in their communities (Ford 1968 and Dunmire and Tierney 1995).

Medicinal use of wild plants is common in northern New Mexico among the Pueblo, Apache, and Navajo people and traditional Hispanics. Dunmire and Turney (1995) assert that 180 different species of wild plants in the region have medicinal uses among 1 or more of the 19 New Mexico Pueblos. Regular medicine gathering trips are conducted to the Pajarito Plateau and other high elevation sites by the Pueblo's medicine societies (Dunmire and Tierney 1995 and Ford 1968). Commonly known medicinal plants include joint-fir, broom snakeweed, sage, and four-o'clocks (Dunmire and Tierney 1995 and Curtin 1947). Osha root is also an important medicinal plant used by American Indians and Hispanics in the region (Ford 1968, Hiles 1992, and Dunmire and Tierney 1995). The locations of collection areas for some of the rarer medicinal plants that grow in the mountains, such as Osha root, may be a closely kept secret of village healers.

Artisan Material Gathering Sites

The gathering of raw materials for numerous commercial and non-commercial utilitarian

objects is common in the American Indian and Hispanic traditional communities. While some utilitarian objects, such as handmade plant fiber cordage, woven yucca sandals, and wooden arrowheads, have generally been replaced by modern products, there are still enduring traditions of weaving, tanning, wood carving, jewelry making, joinery and construction, and pottery making that use native materials gathered locally. The products of these traditional arts have become internationally prized not only because of the aesthetic quality they demonstrate, but also because of their continued use of native woods, fibers, dyes, and minerals. The continued access of traditional communities to the natural resources of the region is vital to the continuation of these traditional arts.

The use of natural dyes, pigments, and tanning agents is still a characteristic of traditional American Indian and Hispanic communities in northern New Mexico (Dunmire and Tierney 1995 and Dickey 1990). Weaving is a very important traditional art form, and many traditional weavers still produce dyes from native plants they have gathered locally (Dickey 1990, Minge 1979, and Dunmire and Tierney 1995).

Three of the important dyes used by traditional Hispanic weavers are imported from Mexico: indigo, cochineal, and brasilwood (logwood) (Anonymous 1976 and Minge 1979). Other important dye-producing plants are gathered from village roadsides, acequia banks, mountain habitats, or the nearby desert (Dunmire and Tierney 1995 and Dickey 1990). These plants include goldenrod, cocklebur, sumac, sunflower, dahlia, chokecherry, chamisa, snakeweed, slatbush, mountain mahogany, oak and alder bark, lichens, caniegra, Virginia creeper, cota or Indian tea, juniper, madder, black walnut, onion skins, and marigold (Anonymous 1976, Minge 1979, Dunmire and Tierney 1995, and Young 1944). Rocky mountain beeplant, wild dock, pinyon pitch, and tansy mustard are used for pottery paints (Dunmire and Tierney 1995), and red clay is sometimes used as a red fabric dye (Young 1944).

Construction woods and adobe clays are also gathered from sources in northern New Mexico. Pueblo and traditional Hispanic construction uses whole logs for vigas (roof beams) made of cottonwood, Ponderosa pine, and Douglas fir (Dickey 1990 and Dunmire and Tierney 1995). Latillas (roof cross-supports) are usually made of split aspen, mountain-mahogany, or oak; roof thatching is made of four-winged saltbush or common reeds (Young 1944, Dickey 1990, and Dunmire and Tierney 1995).

Adobe clay is gathered from many sites near Pueblos and Hispanic villages and mixed with dried plants to form the walls of most buildings in traditional communities (Dickey 1990, Weigle 1978, and Hill 1982). Potter's clay, however, comes from very specialized sites that contain very fine clays without impurities (Dickey 1990 and Peterson 1977).

Wood carving is an artistic tradition in some Hispanic communities (Briggs 1980), and carved wooden Santos are an important tradition of the local churches and Moradas (Dickey 1990 and Briggs 1980). Santos are carved depictions of the saints and allegorical stories in the Catholic traditions and traditionally are of two forms: bultos, or three-dimensional carvings; and retablos, or bas-relief carvings on hinged wooden panels (Briggs 1980). The wood may be augmented with gypsum, metals, and other materials. Paints were originally of natural pigments, but increasingly include commercial products (Briggs 1980). Native wood of outstanding carving characteristics is gathered from the national forests. Preferred wood comes from aspen, berried juniper, willow, and pine (Briggs 1980).

Drums and many other articles are carved from the aspen and cottonwood found in the Pueblo communities (Dunmire and Tierney 1995), and

bows are made from pliable woods such as wild currant, New Mexico locust, and chokecherry (Dunmire and Tierney 1995). Arrows are crafted from various woods and common reeds. Apache plume is most commonly used for making brooms (Dunmire and Tierney 1995).

E.3.3.4 *Traditional Subsistence Features*

Traditional subsistence practices in use in northern New Mexico include community-maintained irrigation ditches, called acequias, traditional trails and hunting areas, traditionally used fields, grazing areas, firewood-gathering sites, and Spanish land grants. While subsistence functions may not be unique to tribal or Hispanic communities, the traditional community is often brought together and identified through their annual subsistence cycle, and these subsistence activities reinforce a world-view and values unique to the community. As such, the protection of these properties ensures the ability to continue traditional community values and identity.

Acequias are the best known example of traditional subsistence features in northern New Mexico. Acequia communities are complex social institutions that have developed around the Hispanic water supply and irrigation systems known as the Acequia Madre (Arellano 1994). Irrigation systems require not only a sedentary lifestyle but also a complex system of social participation and control because of the intense labor required to build, maintain, and regulate them. Many areas in the arid southwest have developed unique traditional practices surrounding the acquisition of water rights and the development and use of irrigation systems. In northern New Mexico, the acequia communities have developed through the commingling of Pueblo and Spanish traditions and the particular demands of the environment (Campa 1979 and Jenkins 1972).

The fertile flood plains of northern New Mexico required tapping the rivers for a reliable water supply for people, crops, and livestock. Wide fluctuations in annual rainfall characterize the region, making the regulation of hydrological systems essential for a sedentary population (Ackerly et al. 1993). Irrigated agriculture, including terraces and reservoirs, has been present in the Rio Grande Valley since A.D. 1400. The Tewa Pueblos produced crops of maize, squash, beans, melons, cotton, and chile using simple but effective irrigation techniques (Arellano 1994). In an early expedition into northern New Mexico, Antonio Espejo observed the agricultural systems at Acoma Pueblo, stating that they had "... found many irrigated corn fields with canals and dams" (Hammond and Rey 1966).

The Spaniards were already familiar with a variety of irrigation techniques dating back to the Roman and Moorish civilizations. In the years after Spanish settlement of northern New Mexico, they augmented native methods of irrigation with those brought from the Iberian peninsula, including social community cooperation and control mechanisms. Eventually, the physical and social practices of Hispanic irrigation became codified legal institutions as well as traditional cultural systems. These are still reflected in New Mexico water law, as well as in the traditional practices of some Hispanic communities.

Acequia systems did not develop without a good deal of contention and social conflict. Spanish and Pueblo traditions differed considerably in the cultural perspective on the relationship of water, religion, and society. Early Spanish water tradition was relatively compatible with Pueblo traditions in that water resources were considered to belong to the community rather than the individual (Ackerly et al. 1993). The concept of the community gradually gave way to privatization and the pursuit of private wealth in the New World (Meyer 1984). Conflicts over water rights and the shared responsibility for acequia maintenance among the Spanish

Colonials increased over time, as did conflicts over water rights between acequia users and neighboring Pueblos.

Article 6 of the *Plan de Pitic*, 1789, specified that all new lands in the northern provinces, subject to irrigation, would receive equal benefits of water from the Acequia Madre through individual outlets and ditches (Meyer 1984). Each landowner, or parcipiante, was to be informed of his outlet location and was not to abuse any neighbor's access to water. Outlets were to be made of stone and mortar, at the individual's expense, to prevent losses to downstream users. Article 19 of the *Plan de Pitic* specifies the fair apportionment of water to the community. Responsibility is given annually to the town council to appoint an overseer, called the alcalde or mayordomo, for each outlet of the Acequia Madre. This person was to apportion the water to all fields in proportion to the needs of each, with each individual landowner having posted hours for irrigation. The alcalde was authorized to hire an assistant to check the outlets for compliance at the proper times and to charge a fee to the landowner if the assistant was required to open the outlet for him. This basic political/ agricultural institution has been followed by Hispanic and Hispanic-influenced communities in Texas, California, parts of Colorado and Arizona, as well as throughout New Mexico (Meyer 1984).

The affairs of the acequia are handled in many Hispanic areas of New Mexico at meetings of La Junta del Agua, a problem-solving-oriented assembly of landowners. This tradition dates back to the Tribunal de las Aguas, which met regularly since the Middle Ages on the steps of the Cathedral of Valencia, Spain, (Campa 1979). The members of La Junta del Agua were respected members of the community. Within this context, important issues of water rights and local power were decided. All the landowners using water from the Acequia Madre still gather in the spring with horses, scrapers, and manpower to clear out debris and rocks and to make any necessary repairs (Meyer 1984). This communal activity, guided by the mayordomo, is called La Fatiga in New Mexico and is often a significant community event for Hispanic villages (Campa 1979).

Pueblo irrigation predates Spanish contact. Centuries of excavation, routine maintenance, and repairs mask any clear-cut evidence of their prehistoric origins (Ford 1976 and Meyer 1984). Acequias are integral to the technological and ceremonial life of the Pueblo. Their use, while very similar to the use in the Hispanic communities, is punctuated by religious and ceremonial events unique to each Pueblo (Ford 1968, Ford 1976, and Hill 1982).

Land grants form the basis of title and land use for many of the traditional communities in northern New Mexico. Land grants were dispensed by the Spanish Crown and Mexican government to the Pueblos and to Spanish settlers "to advance civilized life" in the region. The land grants were of three types: those for individual tracts of irrigable farmland, those that were granted as commons or pasture lands for a community, and those that were given to each Pueblo to regulate for their own purposes (Leonard 1970). The Pueblo land grants only affirmed the Pueblos' rights to existing patterns of land use, but the Hispanic land grants, upheld by U.S. law, shaped the lifestyles of traditional communities in the region (Leonard 1970 and Carlson 1990). Modern Pueblos, including their fields and commons, are considered to be TCPs in their own right. Traditional Hispanic land grant communities may also be considered TCPs in that all of the parts (e.g., individual holdings, commons, acequias, village) are interrelated and required for the continuation of the whole (Leonard 1970, Carlson 1990, Ackerly et al. 1993, and Arellano 1994).

An example of an existing traditional Hispanic Land Grant community in the LANL region is the Canyon de San Diego Land Grant near Jemez Springs (Cline 1972). The grant includes 110,000 acres (44,517 hectares) of commons or

grazed community lands and 6,000 acres (2,428 hectares) of individual farms irrigated by acequias (Cline 1972). The individual farms were granted as parcels along the acequia system. Over generations, the allotments have been further divided as a result of inheritance practices into thin parcels called strip holdings or long fields (Carlson 1990 and Cline 1972). Each borders the acequia on a narrow side. The village is thus characterized by the existence of long fields in the bottomland where corn, beans, squash, alfalfa, and other crops are irrigated by the acequias (Carlson 1990 and Weigle 1978). The acequias and the grazing commons are the shared responsibility of the villagers, and the commons provide not only grazing for livestock but also many other natural resources gathered by individual families (Weigle 1978 and Carlson 1990). Pinyon nuts, firewood, construction wood, ethnobotanicals, and other resources come from the commons, which are frequently mountainous (Carlson 1990). The houses and church or Morada of the village are clustered tightly, reducing any waste of valuable bottomland and providing community solidarity. The routine of community life is punctuated by agricultural, irrigation and religious events, and is broken by periodic treks into the mountains to gather wood and other resources. All elements are necessary not only for subsistence but also to maintain a unique cultural identity in the face of the modern cash economy.

Traditionally used trails and hunting areas form another subsistence element of traditional cultures of northern New Mexico, particularly of the American Indians. Communal hunts are conducted by Pueblo sodalities or moeities, which are often ritualized and geographically specific (Ford 1968). The mountains are generally shared territory among several tribes. Not only are they areas to hunt or gather specific plants, but they are also locations of important shrines with ritual obligations for visitation (Ford 1968 and Nordhaus 1995). Trails to hunting sites, ceremonial sites, and grazing areas were documented for the Jicarilla Apache Tribe (Nordhaus 1995), and Harrington's maps of Pueblo sites also show trails (Harrington 1916). Zuni trails are indicated on a map by Ferguson and Hart (1985). Their trails lead as far as the Great Salt Lake in Utah. The Zuni tribe has also documented ritual hunting areas and deer trap areas (Akins 1993 and Ferguson and Hart 1985).

E.4 Federal and State Regulations Related to Cultural Resources at LANL

The NHPA (16 U.S.C. §470) was passed in 1966. Under the NHPA, federal agencies (in this case, DOE) have specific responsibilities toward cultural resources that are on their lands or that may be affected by their activities. Section 106 of the NHPA requires that DOE take into account the effects of activities on significant cultural resources. DOE is also required to allow the Advisory Council on Historic Places (ACHP) the opportunity to comment on any DOE plan that may affect such resources. Under the ACHP's regulations for implementing Section 106 of the NHPA (published in the Code of Federal Regulations as 36 CFR 800), the ACHP's right to comment is often delegated to the SHPO. The regulations specifically require that DOE identify cultural resources that may be affected by its "undertakings," evaluate the significance of those resources, and assess the effects of its undertakings on those resources. This process must be completed in consultation with the New Mexico SHPO.

Under Section 106, cultural resources are considered significant if they are eligible for inclusion on the NRHP. Federal regulation 36 CFR 60.4 states that cultural resources may be eligible to the NRHP if they meet one or more of the following criteria:

- They are associated with events that have made a significant contribution to the broad patterns of history.
- They are associated with the lives of persons significant to our past.
- They embody the distinctive characteristics of a type, period, or method of construction, or they represent the work of a master; possess high artistic values, and/or represent a significant and distinguishable entity whose components may lack individual distinction.
- They have yielded or may be likely to yield, important information to prehistory or history.

The SHPO and other personnel of the Historic Preservation Division of the New Mexico Office of Cultural Affairs, operate under the NHPA and in particular monitor Section 106 compliance. The Historic Preservation Division also provides technical services, a state-wide database, and Section 106 compliance advisors (18 New Mexico Statutes Annotated [NMSA] §6–1 through 6–17 and 8–1 through 8–8). In addition to assisting DOE in determining cultural resource significance, the New Mexico SHPO is responsible for coordinating state participation in implementing the NHPA (16 U.S.C. §470). The New Mexico SHPO represents the interests of the state and its citizens in the preservation of their cultural heritage and assists DOE in identifying historic properties and assessing impacts of activities. The SHPO may agree or disagree with the responsible agency's assessment of the eligibility of its cultural resources. Ultimately, the determination of eligibility of any cultural resource is made by the keeper of the National Register, DOI (36 CFR 63.2).

To determine the scope of the SWEIS cultural resources evaluation, DOE first met with the New Mexico SHPO. The meeting resulted in a decision that the SWEIS does not, in and of itself, constitute an undertaking; therefore, compliance with Section 106 of the NHPA (16 U.S.C. §470) is not required (PC 1996). However, individual actions covered by the SWEIS might be undertakings requiring Section 106 compliance.

Through development of the LANL SWEIS, the DOE evaluated the potential impacts of proposed actions on cultural resources in order to mitigate impacts, if required, and to ensure compliance with all applicable federal and state requirements.

Of interest in this process are actions that might adversely affect or diminish the integrity of the location, design, setting, materials, workmanship, feeling, or association of a TCP. Adverse effects evaluated for the SWEIS include, but are not limited to

- Physical destruction, damage, or alteration of all or part of the property.
- Isolation of the property from or alteration of the character of the setting when that character contributes to the qualification of the property for nomination to the NRHP.
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.
- Neglect of the property resulting in deterioration or destruction (36 CFR 800.9).

The scientific community has concerns that compliance with federal historic preservation law might impede efforts to remain at the forefront of international research and achievement. In 1989, in response to these concerns, Congress directed the ACHP to study the designation of scientific research institutions as historically significant. Concerns were raised by agencies faced with altering or renovating existing or abandoned research facilities that were considered eligible for the NRHP by the ACHP. The resulting document, titled "Balancing Historic Preservation Needs with the Operations of Highly Technical or Scientific

Facilities," discusses the needs of research institutions to upgrade their facilities and the responsibilities of preservation agencies to implement the requirements of federal historic preservation regulations (ACHP 1991). The following are among the recommendations outlined in the 1991 report:

- Future authorizations for major scientific and technological programs should include public education components focusing, in part, on the communication of the relevant history of science.
- Decisions about projects that may affect historic properties need to be made with as complete an understanding as possible of those effects. However, considerations of preservation options should be kept distinct from the peer review process of awarding research grants and the determination of research priorities central to the scientific research process.
- The ACHP and affected federal agencies should jointly subscribe to a statement of policy that acknowledges the sensitive relationship between scientific research and the evolving history of science and its physical manifestations.
- Federal agencies should determine how they might better coordinate historic preservation programs and planning among facilities managers, public affairs officers, archivists, historians, external affairs officers, and other staff. The ACHP should recommend measures to these agencies to improve the effectiveness, coordination, and consistency of procedures with the purposes of the NHPA (16 U.S.C. 470 §202[a][6]).
- Future scientific achievement, as well as adequately serving the public interest, depends on an understanding of past scientific successes and failures. Federal agencies, in cooperation with other concerned parties, should explore innovative ways for minimizing and meeting the costs of historic preservation that may be associated with the operations and management of historic facilities.
- The ACHP, in cooperation with the Smithsonian Institution, the NPS, and federal agencies, should establish a consensus about what kinds of scientific facilities and objects should be physically preserved for the future. This should include deciding how the historic value of facilities and objects can be determined and which facilities and objects can be "preserved" through documentation. The ACHP suggests that the documentation option would be best suited to historic facilities that are still active.

The study concluded that the ACHP regulations and the Section 106 review process are flexible enough to accommodate the legitimate needs of the scientific and engineering community and their activities at historic facilities (ACHP 1991).

The NPS's *National Register Bulletin 22*, "Guidelines for Evaluating and Nominating Properties that Have Achieved Significance Within the Last Fifty Years" (NPS 1990), emphasizes the importance of carefully establishing the cultural context of properties and evaluating them based on comparisons with other possible properties within the same historical context. A justification or rationale of exceptional importance should be an explicit part of a statement of significance. Such properties frequently qualify for nomination to the NRHP under more than one of the criteria for evaluation for nomination (36 CFR 60.4).

The NPS's *National Register Bulletin 38*, "Guidelines for Evaluating and Documenting Traditional Cultural Properties" (Parker and King 1990) indicates that objects, trails, pathways, physical features, or resource gathering sites that are significant to a living community's historically rooted beliefs, customs, and practices, may be eligible for protection under the NHPA. Within LANL's boundaries, TCPs exist that have both a current

and a traditional importance to existing American Indian and other local communities. Although TCPs have been eligible for the NRHP since its creation (Parker 1993), it was not until *National Register Bulletin 38* was published that their importance was recognized by federal agencies, SHPOs, and other cultural resources managers.

Other pieces of legislation, including the AIRFA of 1978 (42 U.S.C. §1996), the NAGPRA of 1990 (25 U.S.C. §3001), and Executive Order (EO) 13007, deal mostly with religious, ceremonial, or burial sites.

The AIRFA is a joint resolution of Congress stating that the policy of the U.S. is to protect and preserve the right of American Indians to have access to sites, possess and use sacred objects, and worship through traditional rights and ceremonials. The AIRFA is simply a policy statement; no regulations implementing the AIRFA have been promulgated. (However, within DOE, DOE Order 1230.2, *American Indian Policy*, is the implementing regulatory mechanism.)

The NAGPRA places ownership or control of American Indian human remains or funerary objects, excavated or discovered on federal or tribal lands after the date of the act, in the hands of the lineal descendants of the Indian tribe. Moreover, the NAGPRA requires agencies and museums with collections of American Indian human remains or associated funerary objects to inventory those remains; identify their geographic and cultural affiliations, in consultation with tribal governments and religious leaders. They then must provide each Indian tribe with a copy of the inventory of remains associated with that tribe, an inventory of remains not clearly associated, and access to records, catalogues, and studies. If the cultural affiliation is established or demonstrated through "geographical, kinship, biological, archaeological, anthropological, linguistic, folkloric, oral traditional, historical, or other relevant information, or expert opinion" (43 CFR 10.7[a][4]), the remains must be returned, if requested. The regulations implementing the NAGPRA, published in 1995 (43 CFR 10), provide a systematic process for determining the rights of lineal descendants and Indian tribes to the remains, and instructions for consultation.

Consultation with lineal descendants and affiliated tribes is required at several stages of NAGPRA compliance. Intentional archaeological excavations of human remains, funerary objects, sacred objects, or objects of cultural patrimony on federal lands are permitted only after consultation with appropriate Indian tribes (43 CFR 10.3). Consultation must include any tribes that are likely to be culturally affiliated with or to have occupied the area, or that have a demonstrated cultural relationship to the remains (43 CFR 10.5). Prior notification of Indian tribes who have likely affiliation, have aboriginal use of the area, or who are otherwise culturally related to the remains is required if an activity may result in the excavation of such remains (43 CFR 10.3[c]). Inadvertent discoveries require notification of "likely to be culturally affiliated" Indian tribes within three working days and cessation of all disturbance in the area. In addition, the person or agency responsible for the discovery must protect the site from further disturbance. The project may resume in 30 days after notification unless a plan, such as a memorandum of agreement (MOA) is in place. In the event of emergency discoveries, consultation should be coordinated with the reporting responsibilities of other legislation. Additionally, 43 CFR 10.6 recommends that federal agencies enter into comprehensive agreements with Indian tribes, addressing all federal agency land management activities that could result in the intentional excavation or inadvertent discovery of such remains, and that they establish a process for effectively carrying out the NAGPRA requirements. LANL has completed an inventory in compliance with the NAGPRA;

however, to date, the NAGPRA consultations have included only the four Accord Pueblos.

EO 13007 directs agencies to accommodate access to and ceremonial use of Indian sacred sites on federal lands by Indian religious practitioners, and to avoid adversely affecting the physical integrity of such sites. A sacred site is defined as a "discrete, narrowly delineated location of federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance or for ceremonial use by an Indian religion." EO 13007 is applicable to some TCPs and adds protection to newly established ceremonial sites; however, it does not apply to subsistence features, artisan gathering sites, and ethnobotanical gathering sites.

Within 1 year of the effective date of EO 13007, the head of each agency was directed to report the following to the President:

- Changes necessary to accommodate access to Indian sacred sites.
- Changes necessary to avoid adversely affecting the physical integrity of sacred sites.
- Procedures implemented or proposed to facilitate consultation with appropriate Indian tribes and religious leaders and resolution of disputes.

A draft report for compliance with EO 13007, prepared by DOE in May 1997, states that DOE will accommodate access to sites by working directly with tribes to identify their needs for access or barriers to access, developing MOAs with tribes, and developing and implementing cultural resource plans in consultation with tribal officials. Changes necessary to avoid adversely affecting Indian sacred sites are continuing outreach to tribes to expand DOE's ability to identify sites, to develop and to implement cultural resource plans in consultation with tribes, and to incorporate tribal representatives into cultural resource planning. Consultation with Indian tribes will be facilitated by training DOE personnel, with assistance from tribal members; developing specific consultation procedures or using existing procedures such as those for the *National Environmental Policy Act* (NEPA) (42 U.S.C. §4321) and Section 106 compliance, and seeking to resolve disputes with tribes.

Other legislation explicitly requires inventories of significant resources. Section 110 of the NHPA requires agencies to inventory significant sites under their jurisdiction and to develop plans to manage those resources. Also, EO 11593, §2(a) (1971) orders agencies to "locate, inventory, and nominate to the Secretary of the Interior all sites, buildings, and objects under their jurisdiction or control that appear to qualify for listing in the NRHP." Furthermore, it directs agencies to submit to the Secretary of the Interior procedures for the maintenance and preservation of historic and archaeological sites under their control (EO 11593, §2[d]). This legislation forms the basis for protecting cultural resources.

E.5 RESEARCH METHODOLOGY

Anthropologists and historians have developed the concept of historical context as a framework to facilitate the evaluation of significance. Historical context facilitates the evaluation process by grouping information about cultural resources based on a shared theme, specific time period, and geographical area (48 *Federal Register* [FR] 44739). Historical context provides a flexible and legitimate basis for site-wide planning decisions that may affect cultural resources, and is developed by the SHPO to provide a basis for evaluating prehistoric and historic sites by identifying patterns or research problems in the historical and prehistoric record. Patterns or research problems include (48 FR 44718–44719):

- The chronological period and geographical area of each context.
- A compilation of existing information obtained through literature and background searches.
- The identification of trends in research and cultural values of the settlement, architecture, and art.
- A definition of property or site types by characteristics of each type.
- The identification of gaps in the body of information concerning historical context.

Historical context, then, includes both temporal and spatial information as well as artifacts and structures. It is ideal for incorporating cultural resources into the SWEIS because it is nonjudgmental; it includes elements of significance without implicating sites or localities as significant or insignificant. While the development of context is beyond the scope of the SWEIS, the SWEIS research methodology used the paradigm outlined above to categorize cultural resources.

Historical contexts are not well defined for New Mexico. Researchers in the state generally apply a research design published in 1981 by the State of New Mexico, Office of Cultural Affairs, Historic Preservation Division, titled "Prehistoric New Mexico; Background for Survey" (Stuart and Gauthier 1981). Although this research is applicable, it lacks the framework to evaluate site significance that is intended for contexts. Several Historic Period contexts were defined in a manuscript titled "New Mexico Historic Contexts" (Pratt and Scurlock 1993). Pratt and Scurlock (1993) recommended the development of a nuclear energy context, extending in time from 1943 to the present and including Los Alamos, Albuquerque, the Trinity Site, and southeastern New Mexico, with associated property types (laboratories, reactors, nuclear development and testing sites, and waste storage sites). The absence of a defined nuclear energy context makes classification and evaluation of historic resources at LANL difficult and results in a data gap for the SWEIS and for the cultural resources management program at LANL.

E.5.1 Research Methods for Acquiring Data on Prehistoric Cultural Resources

Archaeological and cultural data on the existing prehistoric cultural resources at LANL were acquired from the LANL Cultural Resources Management Team; the New Mexico Office of Cultural Affairs, Historic Preservation Division; the New Mexico State Register of Cultural Properties; and the Museum of New Mexico, Laboratory of Anthropology, Archaeological Records Management Systems (ARMS). A review of published records and literature about the history and cultures of northern New Mexico was also conducted as part of the SWEIS.

Comprehensive data on cultural resources at LANL are maintained in paper and electronic databases and Geographic Information System (GIS) by the LANL Cultural Resource Management Team and include both compliance information and cultural/ archaeological data (PC 1995). The LANL Cultural Resources electronic database was reviewed. Some sites have been recorded or confirmed recently by the LANL Cultural Resource Management Team, while others have been previously recorded, using methods and controls that may be different from present standards. Sites are classified in the electronic database according to available information on location, site type, and eligibility status. They are not, however, classified according to age or cultural affiliation. Cultural resource data are transferred, using site forms, from LANL to the New Mexico ARMS database at the Museum of New Mexico, Laboratory of Anthropology. A lag of approximately 10 years exists in the processing and transfer of some data to ARMS, resulting in differences in the numbers of sites in

each electronic database as well as in the types of information conveyed in each database.

Attempts were made to reconcile the two electronic databases in order to obtain information about the historical context of prehistoric resources and the numbers and types of cultural components of each site. Discrepancies were found between the two electronic databases that prevented the inclusion of ARMS data in the SWEIS. Therefore, the site numbers, locations, and site type data provided by the LANL Cultural Resources Team form the basis of this study. Prehistoric resources were incorporated into a GIS for overlay impacts analysis. Methods were developed to ensure that sensitive cultural resource information was not jeopardized during the study.

E.5.2 Research Methods for Acquiring Data on Historic Cultural Resources

Data on Historic Period resources were obtained from several sources. Data relating to the Spanish Colonial and U.S. Territorial periods were obtained from the LANL Cultural Resource Management Team database and publications. Data about cultural resources constructed at LANL during the Nuclear Energy Period were obtained from the LANL report, *Capital Asset Management Process, Fiscal Year 1997* (LANL 1995a), the Facility for Information Management, Analysis, and Display (FIMAD) database (LANL 1996), the as-built structure location maps for LANL (GITL 1997), the Environmental Restoration Program Decommissioning Summary Site Plan (LANL 1995b), and the LANL Cultural Resource Management Team database and publications. The locations of known structures dating from the Nuclear Energy Period were determined from facility maps and incorporated into a GIS for overlay impacts analysis.

These data do not include non-building remains of those periods and do not fully identify the numerous interrelated infrastructure support systems and functional systems present at LANL. The LANL Cultural Resource Management Team has a database of potential historic facilities that includes many existing and demolished structures (LANL Cultural Resource Database). These data have been excluded from the list of known resources until further documentation can be obtained to link them with the historical context of the Nuclear Energy Period.

E.5.3 Research Methods for Acquiring Data on Traditional Cultural Properties

TCPs were studied, using methods designed to identify categories and specific resources, to assess potential impacts from LANL operations and to provide recommendations to protect those resources from adverse effects from future LANL activities. The purpose of the study was to determine if properties exist within the LANL region that continue to hold cultural significance to those groups claiming traditional use or affiliation with the LANL area. TCP identification, evaluation, and documentation processes were conducted using the guidelines specified in *National Register Bulletin 38* (Parker and King 1990), which addresses eligibility to the NRHP. Natural, physical, biological, political, ideological, and man-made places significant to the local communities for ideological, economic, or historic reasons were identified in this study.

The goals of the SWEIS TCP study were to identify:

- Those American Indian, Hispanic, and other communities with cultural affiliations in the LANL area.

- The types of TCPs in the LANL region that could be affected by LANL and the kinds of LANL activities that could affect them.
- Potential avenues of mitigation that would avoid or minimize impacts to traditional properties.

The primary focus of the TCP study was American Indian and Hispanic traditional communities. However, if TCPs associated with other cultures or groups were identified during the course of this study, they were also acknowledged here.

The TCP research methods used in this study include the following elements:

- *Identify Traditional Communities That Maintain Affiliation with or Traditional Use of the LANL Area*. A 50-mile (80-kilometer) radius around LANL was used to identify communities to establish consultations. Other communities identified through the literature review were then added to the list.
- *Conduct Initial Consultations with Potential TCP Communities*. This level of consultation includes identifying appropriate contacts, making telephone calls, and setting up meetings with communities to introduce the SWEIS and inquire about their desire to participate in the SWEIS process.
- *Enter into Agreements for TCP Community Consultations*. Interested traditional communities established the methods for identifying TCPs of concern to them in the LANL area. Most traditional communities completed TCP field survey forms and provided either written or oral commentary on the cultural resource reference materials used in preparing sections of the Draft SWEIS. Participating traditional communities had review and editing rights regarding sensitive information prior to publication.
- *Review Ethnographic Literature*. Ethnographic literature was reviewed to understand the range and types of TCPs for selected traditional communities that have documented affiliations to the study area or have expressed a cultural affiliation to the affected environment on the basis of TCP community histories. The list of American Indian cultures covered in the ethnographic literature review includes approximately 17 Pueblo and Athabaskan cultures that have vested interests in the protection of traditional places in the LANL region. These cultures include the following:
  - Pueblo of Nambe
  - Hispanic Communities
  - Pueblo of Taos
  - Pueblo de Cochiti
  - Pueblo of Picuris
  - Pueblo of Jemez
  - Pueblo of San Ildefonso
  - Pueblo of Sandia
  - Jicarilla Apache Tribe
  - Pueblo of Santo Domingo
  - Pueblo of San Juan
  - Pueblo of Zia
  - Pueblo of Santa Clara
  - Pueblo of Zuni
  - Pueblo of Pojoaque
  - Hopi Tribe
  - Pueblo of Tesuque
  - Navajo Nation
- *Conduct the Consultations with Communities or Groups Identified*. Consultations are meetings held within the potentially affected community. They include community/tribal representatives, leaders, elders, and resource specialists identified during the research and networking efforts outlined above. A field survey form was designed to facilitate discussions with traditional communities, assist in the recording and classification of TCPs, record concerns of potential effects of LANL operations, record suggestions for

mitigation measures, and suggest methods to preserve TCPs. The methods used at TCP consultations were flexible in order to respond to the needs of different communities. For example, some communities conducted their own consultations. A Consultation Recording Sheet and a map showing LANL and surrounding areas were left with the communities. The consultations were completed by community members or staff and returned to the researchers.

- *Identify and Contact Traditional Hispanic Community Leaders*. Similar to Pueblo/ Tribal consultations, consultations with Hispanic weavers, herbalists, lay-brotherhood members, artisans, acequia (shared community ditch) commissioners, mayordomos/mayordomas, and acequia federation offices were conducted to obtain information for the TCP study, solicit participation, and make possible the assessment of impacts. Consultations were conducted by letter, follow-up phone calls, group consultations, and site visits.
- *Identify and Invite the Participation of Regional Traditional Hispanic Organizations*. Hispanic organizations that represent the interests of traditional communities, such as artisan guilds, rural development organizations, and others were contacted and invited to participate in group consultations to identify Hispanic TCPs and possible impacts of LANL activities.
- *Conduct Hispanic Community Meetings and Interviews*. Hispanic TCPs were identified through two community meetings: one held in Jemez Springs, New Mexico, and the other held in Española, New Mexico. The general format of the meetings included a presentation on the goals and purpose of the SWEIS and definitions and examples of TCPs, followed by responses to questions regarding the TCP field survey forms. Records of the meetings were transcribed and submitted to the communities for review and comment.
- *Analyze Findings in TCP Field Survey Forms*. A classification system was developed for TCPs, based on the results of the literature search and consultations. This system was organized by category, including shrines, plant gathering areas, clay procurement areas for pottery making, hunting areas, technology sites (tool-making), and acequias. The analysis included synthesizing information from the literature review and consultations.
- *Review of TCP Information for the Draft SWEIS*. Consultations included a 30-day period to review the reference materials used for preparation of cultural resource sections of the Draft SWEIS. This was a separate review process that was limited strictly to the cultural resource sections. Upon receipt of review comments, the draft cultural resource sections were edited to reflect relevant comments.

E.5.4 Impacts Analysis Methods

The goals of the SWEIS cultural resources impacts analysis were to assess the general scale and intensity of impacts to the cultural resources from activity levels in each of the SWEIS alternatives. The cultural resource impacts analysis is not intended to take the place of project-specific NHPA and NEPA reviews, but to provide a comparative assessment of the impacts to cultural resources to be expected from each alternative.

The following parameters were established for impacts analysis:

- All cultural resources were considered in the cultural resource impacts analysis regardless of eligibility. These resources were from three broad categories: prehistoric archaeological sites, historic resources, and TCPs.
- The impacts analysis considers general categories of cultural resource types (e.g., simple and complex pueblos, scientific

laboratories, ceremonial sites) rather than impacts to individual resources. The types of effects and levels of adversity were determined for each resource class.

- Impacts are evaluated in a general manner and according to four broad categories that reflect the criteria of effect (36 CFR 800.9): destruction/alteration; isolation and restriction of access; introduction of visual, audible, or atmospheric elements out of character with the resource; and neglect leading to deterioration and vandalism. Not all classes of cultural resources will be affected by every category of effect.
- Adverse effects to any resource category were evaluated for each of the four SWEIS alternatives by means of a data matrix. Geographic overlay analysis and detailed project descriptions were used to assist in identifying the numbers and types of cultural resources that might be affected by the alternatives. Results of the consequence analysis for air quality, surface and groundwater, human health risk, and noise and vibration will be used to evaluate impacts to human users of TCPs and other potential impacts to cultural resources.
- Data from recent LANL operations were used as points of comparison for the relative severity of cultural resource impacts under each alternative. The degree of adverse impacts were qualitatively assessed according to the approximate number of resources adversely affected, the intensity of the impact, and the duration of the impact.

Table E.5.4–1 summarizes the potential for effects of various actions on categories of prehistoric cultural resources found at LANL. Table E.5.4–2 provides the potential for effects of various actions on historic resources at LANL, while Table E.5.4–3 gives the potential for effects of various actions on TCPs. LANL operations and projects reflected in the SWEIS alternatives were evaluated according to their potential effects on nearby resources, as described in these tables.

E.6 Existing Conditions for Cultural Resources at LANL

The following subsections contain discussions of LANL's cultural resource management and the existing prehistoric, historic, and traditional cultural resources within the boundaries defined in the SWEIS or within the areas of potential impact. All data on existing conditions within LANL boundaries, including policy, procedural issues, and existing resources, were obtained for 1995 conditions. It is assumed that both policies and known resources are constantly changing within a facility as large as LANL. One area of cultural resource management, in particular, has been undergoing rapid change at LANL: the development of new contacts among LANL and the various American Indian tribal governments.

E.6.1 Cultural Resource Management at LANL

Issues regarding cultural resources at LANL are handled by the LANL Cultural Resources Management Team (CRMT) of the Environmental Assessments and Resource Evaluations Group of the Environment, Safety, and Health Division at LANL.

In a memorandum from the Director of the Environmental Guidance Division, DOE Headquarters, dated February 23, 1990, DOE was directed to ensure that management of cultural resources at all DOE facilities is in compliance with all cultural resource executive orders, laws, and regulations. The memo further stipulates that DOE programs must budget sufficient funds to support cultural resource compliance actions and programs. The CRMT follows the LANL compliance procedure outlined in the LANL *Cultural Resource*

TABLE E.5.4–1.—*Potential Impacts of Actions on Prehistoric Resource Types*

ACTION TYPE	PUEBLO STRUCTURES	ERODED PUEBLOS/ RUBBLE/ ARTIFACT SCATTER	CAVATE PUEBLOS/ROCK ART/SHELTERS AND OVERHANGS	TRAILS/STEPS/ ROCK RINGS OR STONE ARRANGEMENTS
New Construction (direct)	Destruction/alteration Removal of or damage to sites	Destruction/alteration Removal of or damage to sites	Destruction/alteration Removal of or damage to sites	Destruction/alteration Removal of or damage to sites
Increased Vibrations (from traffic, explosive testing, etc.	Destruction/alteration Damage to sites	None	Destruction/alteration Removal of or damage to sites	Destruction/alteration Removal of or damage to sites
Increased Erosion or Siltation	Destruction/alteration Damage to sites	Destruction/alteration Damage to sites	Destruction/alteration Damage to sites	Destruction/alteration Damage to sites
Shrapnel Scatter from Firing Points	Isolation/restriction of access Inability to access sites because of hazardous conditions	Isolation/restriction of access Inability to access sites because of hazardous conditions	Isolation/restriction of access Inability to access sites because of hazardous conditions	Isolation/restriction of access Inability to access sites because of hazardous conditions
Explosives (direct hits)	Destruction/alteration Removal of or damage to sites	Destruction/alteration Removal of or damage to sites	Destruction/alteration Removal of or damage to sites	Destruction/alteration Removal of or damage to sites
Radiation Hazards (from airborne or waterborne contamination)	Isolation/restriction of access Inability to access sites because of hazardous conditions	Isolation/restriction of access Inability to access sites because of hazardous conditions	Isolation/restriction of access Inability to access sites because of hazardous conditions	Isolation/restriction of access Inability to access sites because of hazardous conditions
Noise	None	None	None	None
Hazardous Material (nonradiological from airborne or waterborne contamination)	Isolation/restriction of access Inability to access sites because of hazardous conditions	Isolation/restriction of access Inability to access sites because of hazardous conditions	Isolation/restriction of access Inability to access sites because of hazardous conditions	Isolation/restriction of access Inability to access sites because of hazardous conditions
Reduced Security	Destruction/neglect, alteration Removal of or damage to sites Deterioration and damage to sites from vandalism	Destruction/neglect, alteration Removal of or damage to sites Deterioration and damage to sites from vandalism	Destruction/neglect, alteration Removal of or damage to sites Deterioration and damage to sites from vandalism	Destruction/neglect, alteration Removal of or damage to sites Deterioration and damage to sites from vandalism

Note: For archaeological sites that are also TCPs, refer to Table E.5.4–3.

TABLE E.5.4–2.—*Potential Impacts of Actions on Historic Resource Categories*

ACTION TYPE	U.S. TERRITORIAL AND HOMESTEAD SITES	NUCLEAR ENERGY PERIOD BUILDINGS, DISTRICTS AND SITES (1943 TO 1989)			
		ADMINISTRATION BUILDINGS	STORAGE AND SERVICE	LABORATORIES AND PRODUCTION	HOUSING AND OTHER
New Construction (direct or indirect)	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting
Increased Noise and Vibrations	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites
Increased Erosion or Siltation	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites
Explosives Testing (direct hits or shrapnel scatter)	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites
Radiation and Nonradiological Hazards (from airborne or waterborne contamination)	Isolation Inability to access sites because of hazardous conditions	Isolation Inability to access sites because of hazardous conditions	Isolation Inability to access sites because of hazardous conditions	Isolation Inability to access sites because of hazardous conditions	Isolation Inability to access sites because of hazardous conditions
Decommissioning and Demolition	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites
Refurbishing Buildings; Changing Building Function	None	Destruction/ alteration Removal of or damage to significant components Introduction of elements out of character with setting	Destruction/ alteration Removal of or damage to significant components Introduction of elements out of character with setting	Destruction/ alteration Removal of or damage to significant components Introduction of elements out of character with setting	Destruction/ alteration Removal of or damage to significant components Introduction of elements out of character with setting

TABLE E.5.4–2.—*Potential Impacts of Actions on Historic Resource Categories*-Continued

ACTION TYPE	U.S. TERRITORIAL AND HOMESTEAD SITES	NUCLEAR ENERGY PERIOD BUILDINGS, DISTRICTS AND SITES (1943 TO 1989)			
		ADMINISTRATION BUILDINGS	STORAGE AND SERVICE	LABORATORIES AND PRODUCTION	HOUSING AND OTHER
Reduced Security/ Abandonment/Lack of Use	Neglect Deterioration and damage to sites from vandalism Destruction/ alteration Removal of or damage to sites	Neglect Deterioration and damage to sites from vandalism Destruction/ alteration Removal of or damage to sites	Neglect Deterioration and damage to sites from vandalism Destruction/ alteration Removal of or damage to sites	Neglect Deterioration and damage to sites from vandalism Destruction/ alteration Removal of or damage to sites	Neglect Deterioration and damage to sites from vandalism Destruction/ alteration Removal of or damage to sites

TABLE E.5.4–3.—*Potential Impacts of Actions on Traditional Cultural Property Categories*

ACTION TYPE	CEREMONIAL AND ARCH. SITES	NATURAL FEATURES	ETHNOBOTANICAL GATHERING SITES	ARTISAN MATERIALS GATHERING SITES	SUBSISTENCE FEATURES
New Construction (direct)	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal or damage to sites
New Construction (roads, towers, fences, signs or buildings that would be visible from TCPs or make TCPs more visible)	Introduction of elements out of character with setting Isolation Sites separated from trails and/or linked sites	Introduction of elements out of character with setting Isolation View interference	Introduction of elements out of character with setting Isolation Sites separated from trails and/or linked sites	Introduction of elements out of character with setting Isolation Sites separated from trails and/or linked sites	Destruction/ alteration Disturbance of wildlife Isolation Sites separated from trails and/ or linked sites
Increased Vibrations (from traffic, explosive testing, etc.	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites	Destruction/alteration Damage to sites Introduction of elements out of character with setting	Destruction/ alteration Damage to sites Introduction of elements out of character with setting	Destruction/ alteration Disturbance of wildlife
Increased Erosion or Siltation (from changes in runoff)	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites	Destruction/alteration Damage to sites	Destruction/ alteration Damage to sites	Destruction/ alteration Damage to sites
Shrapnel from Firing Points	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting Inability to access sites because of hazardous conditions	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting Inability to access sites because of hazardous conditions	Destruction/alteration Damage to sites Isolation/restriction of access Inability to access sites because of hazardous conditions	Destruction/ alteration Damage to sites Isolation/ restriction of access Inability to access sites because of hazardous conditions	Destruction/ alteration Disturbance of wildlife Isolation Inability to access sites because of hazardous conditions

TABLE E.5.4–3.—*Potential Impacts of Actions on Traditional Cultural Property Categories*-Continued

ACTION TYPE	CEREMONIAL AND ARCH. SITES	NATURAL FEATURES	ETHNOBOTANICAL GATHERING SITES	ARTISAN MATERIALS GATHERING SITES	SUBSISTENCE FEATURES
Explosives (direct hits from testing)	Destruction/ alteration Removal of or damage to sites Introduction of physical changes in setting Isolation/ restriction of access Inability to access sites because of hazardous conditions	Destruction/ alteration Removal of or damage to sites Introduction of physical changes in setting Isolation/ restriction of access Inability to access sites because of hazardous conditions	Destruction/ alteration Removal of or damage to sites Isolation/restriction of access Inability to access sites because of hazardous conditions	Destruction/ alteration Removal of or damage to sites Isolation/ restriction of access Inability to access sites because of hazardous conditions	Destruction/ alteration Disturbance to wildlife Isolation/ restriction of access Inability to access sites because of hazardous conditions
Radiation Hazards (from airborne or waterborne contamination)	Introduction of elements out of character with setting Isolation/ restriction of access Inability to access sites because of hazardous conditions	Introduction of elements out of character with setting Isolation/ restriction of access Inability to access sites because of hazardous conditions	Isolation/restriction of access Inability to access sites because of hazardous conditions	Isolation/ restriction of access Inability to access sites because of hazardous conditions	Isolation/ restriction of access Inability to access sites because of hazardous conditions
Noise	Introduction of elements out of character with setting	Introduction of elements out of character with setting	Introduction of elements out of character with setting	Introduction of elements out of character with setting	Destruction/ alteration Disturbance to wildlife
Hazardous Material (Nonradiological from airborne or waterborne contamination)	Introduction of elements out of character with setting Isolation/ restriction of access Inability to access sites because of contamination	Introduction of elements out of character with setting Isolation/ restriction of access Inability to access sites because of contamination	Destruction/alteration Removal or damage to sites Isolation/restriction of access Inability to access sites because of contamination	Destruction/ alteration Removal or damage to sites Isolation/ restriction of access Inability to access sites because of contamination	Destruction/ alteration Removal or damage to sites Isolation/ restriction of access Inability to access sites because of contamination

TABLE E.5.4–3.—*Potential Impacts of Actions on Traditional Cultural Property Categories*-Continued

ACTION TYPE	CEREMONIAL AND ARCH. SITES	NATURAL FEATURES	ETHNOBOTANICAL GATHERING SITES	ARTISAN MATERIALS GATHERING SITES	SUBSISTENCE FEATURES
Increased Security Restrictions	Isolation/ restriction of access Inability to access sites	Isolation/ restriction of access Inability to access sites	Isolation/restriction of access Inability to access sites	Isolation/ restriction of access Inability to access sites	Isolation/ restriction of access Inability to access sites
Changed Water Quality in Natural Springs/ Streams	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting Isolation/ restriction of access Inability to access sites	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting Isolation/ restriction of access Inability to access sites	Destruction/alteration Removal of or damage to sites Introduction of elements out of character with setting Isolation/restriction of access Inability to access sites	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting Isolation/ restriction of access Inability to access sites	Destruction/ alteration Removal of or damage to sites Introduction of elements out of character with setting Isolation/ restriction of access Inability to access sites
Hydrologic Changes	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites	Destruction/ alteration Removal of or damage to sites
Changes in Maintenance	Destruction/ alteration Erosion of archeological sites	Destruction/ alteration Erosion of natural features	Destruction/alteration Erosion of natural features	Destruction/ alteration Erosion of natural features	Destruction/ alteration Erosion of natural features
Reduced Security	Destruction/ alteration Removal of or damage to sites from vandalism	Destruction/ alteration Vandalism and damage from lack of protection	Destruction/ alteration Increased visitation and damage from lack of protection	Destruction/ alteration Increased use and damage from lack of protection	Destruction/ alteration Loss of wildlife from increased hunting or visitation
Transfer of Ownership (to ownership outside SHPO review)	Destruction/ alteration Removal of or damage to sites Neglect Damage from vandalism, loss of protected status	Destruction/ alteration Removal of or damage to sites Neglect Damage from vandalism, loss of protected status	Destruction/ alteration Removal of or damage to sites Neglect Damage from vandalism, loss of protected status	Destruction/ alteration Removal of or damage to sites Neglect Damage from vandalism, loss of protected status	Destruction/ alteration Removal of or damage to sites Neglect Damage from vandalism, loss of protected status

TABLE E.5.4–3.—*Potential Impacts of Actions on Traditional Cultural Property Categories*-Continued

ACTION TYPE	CEREMONIAL AND ARCH. SITES	NATURAL FEATURES	ETHNOBOTANICAL GATHERING SITES	ARTISAN MATERIALS GATHERING SITES	SUBSISTENCE FEATURES
New Fencing	Isolation/ restriction of access Inability to access sites Introduction of elements out of character with setting	Isolation/ restriction of access Inability to access sites Introduction of elements out of character with setting	Isolation/restriction of access Inability to access sites Introduction of elements out of character with setting	Isolation/ restriction of access Inability to access sites Introduction of elements out of character with setting	Isolation/ restriction of access Inability to access sites Introduction of elements out of character with setting

Overview and Data Inventory 1995. The procedure was designed to keep LANL in compliance with the NHPA of 1966, as amended (16 U.S.C. §470); the *Archaeological Resource Protection Act* (ARPA) of 1979; AIRFA of 1978 (42 U.S.C. §1996); Executive Order 13007, Section 2(b); NAGPRA of 1990 (25 U.S.C. §3001); NEPA (42 U.S.C. §4321); and DOE's American Indian Policy (DOE Order 1230.2).

According to the LANL compliance procedure, the CRMT follows a step-by-step process to evaluate LANL actions for cultural resource compliance.

- The CRMT reviews all proposed LANL actions to determine if they are undertakings as defined in 36 CFR Part 800. According to the LANL compliance procedure, "Undertakings are activities that have the potential to affect a cultural resource and are typically activities outside buildings that disturb the ground" (LANL 1995c).
- Once an action is determined to be an undertaking, the CRMT conducts surveys of the affected area to determine if eligible cultural resources are likely to be affected by the proposed action. Cultural resource surveys are LANL controlled-release documents that are sent to the SHPO for concurrence with findings and for making determinations of eligibility. The surveys are also sent to the governors of the four Accord tribes (San Ildefonso, Santa Clara, Jemez, and Cochiti) for comment and identification of TCPs in the affected area.
- If both the DOE and the SHPO agree that a particular undertaking will have an adverse affect on eligible cultural resources, the CRMT develops a mitigation plan, specifying how the adverse effect will be mitigated. The mitigation plan is reviewed and approved by the SHPO and the National Advisory Council on Historic Preservation. According to the LANL compliance procedure, input from the public and interested American Indian groups is also solicited.
- Implementation of the mitigation plan may involve excavation of prehistoric sites if they are eligible for the NRHP under Criterion D alone. Data are analyzed by the CRMT as specified by the mitigation plan, and all recovered artifacts are curated at the Museum of New Mexico in Santa Fe, New Mexico.

In addition to the steps outlined above, measures are taken by the CRMT to provide American Indian tribes with access to information and input to the process of cultural resource management. Monthly meetings are held among DOE, the CRMT, LANL's legal counsel, LANL's Government Relations Office, and representatives of the four Accord tribes: San Ildefonso, Santa Clara, Jemez, and Cochiti. At these meetings, tribal representatives are advised of projects that may have impacts to cultural resources. According to the LANL compliance procedure, "...their input is invited on all phases of cultural resource survey, report preparation, determination of effects to cultural resources, and design of mitigation measures" (LANL 1995c). Any other tribes that identify themselves to LANL as having cultural affiliation with the region may also take part in these meetings or may be notified of LANL actions and included in consultations (Oakes 1997).

For purposes of compliance with NAGPRA, since 1995 the CRMT policy has been to contact local pueblo groups believed to be culturally affiliated with prehistoric sites at LANL, whenever human remains are uncovered. These pueblo groups would be asked for direction in the treatment and disposition of human remains.

The CRMT maintains a cultural resource administrative paper database and an electronic database and GIS of archaeological survey data. Administrative and compliance data are maintained on paper and electronically. These data include project review information,

cultural resource survey data, and data on any subsequent reports. Archaeological data files include location data, site type, age, cultural affiliation, survey information, TA numbers, eligibility information, and any associated report numbers. As of 1995, the electronic prehistoric database did not contain data on the age or cultural affiliation of archaeological resources at LANL; however, these data could be found in the CRMT's paper database.

A separate electronic database has been maintained for historic resources at LANL from the Nuclear Energy Period (post-1942). This database is organized by LANL facility number and includes information about building or structure type, location, construction date, and current status or use. Some data have been added in 1995 from surveys that were conducted prior to demolition of a number of structures from this period. Comprehensive surveys have not been conducted to identify Nuclear Energy Period resources, including those from the World War II/Early Nuclear Weapons Development Period at LANL.

An archaeological site number is assigned to each new archaeological site that is encountered at LANL and a site form is filled out for most, but not all sites (LANL 1995c). Data included on the site forms have changed over the years, producing inconsistencies in the database. Beginning in 1995, the state's standard site form (used in the New Mexico Cultural Resource Information System) has been used by the CRMT. Prior to 1978, data on the site type and the age of the site were not consistently included on site forms used at LANL (PC 1995 and LANL 1995c). Site forms should be submitted to the SHPO for inclusion in the state database and the New Mexico Historic Preservation Division's ARMS. Some submittals to the SHPO are several years behind (PC 1995).

As a result of differences in information recorded on site forms at LANL and delays in the submittal of site forms to the SHPO, discrepancies exist between the state site records and LANL records.

E.6.2 Prehistoric Resources Within LANL Boundaries

A total of 1,302 prehistoric archaeological sites (sites with unique Laboratory of Anthropology numbers) have been identified within or very near LANL boundaries during archaeological investigations (LANL 1995c). The areas being considered in the SWEIS contain 1,295 sites, according to GIS overlay analysis. A breakdown of archaeological site types is provided in Table E.6.2–1. The site types have been grouped in this table according to the manner in which they respond to various impacts, such as vibration, erosion, corrosion, or explosions.

Eligibility assessments have been made on 1,192 prehistoric sites, with 770 sites found to be eligible for inclusion in the NRHP. There are 322 sites that are potentially eligible, and only 100 sites have been determined ineligible for nomination to the NRHP. The remaining 103

TABLE E.6.2–1.—*Prehistoric Cultural Resource Sites Within LANL Boundaries*

SITE TYPE	NUMBER OF SITES
Simple Pueblos	665
Complex Pueblos	62
Rock Shelters, Cavate (small caves) Pueblos	213
Rock Art	40
Water Control Features, Game Traps	56
Trails, Steps	20
Highly Eroded Pueblos, Rubble	29
Artifact Scatter, Stone Chips (lithic scatter), Rock Rings	210
TOTAL	1,295

Source: LANL 1995c

sites have not been assessed for eligibility, but are assumed to be potentially eligible by the LANL CRMT until further assessment is completed (PC 1995).

Archaeological survey work has been extensive at LANL. Several hundred small, project-related archaeological surveys have been conducted since the implementation of the NHPA at LANL in the early 1970's (LANL 1995c). Only 25 percent of LANL remains completely unsurveyed (LANL 1995c). Many LANL areas have been surveyed for archaeological resources at 100 percent coverage; others have been surveyed with only 60 percent coverage.

E.6.3 Historic Cultural Resources Within LANL Boundaries

A total of 2,319 cultural resources date from the Historic Period. There are 87 known cultural resources within LANL boundaries that date from the Early U.S. Territorial/Statehood Period, as shown in Table E.6.3–1. Most of these cultural resources have been recorded and their eligibility has been established in some cases. Of the 87 homestead resources, 22 are eligible for the NRHP. One site is also listed on the State Register of Cultural Properties. Three of these sites have been excavated (LANL 1995c).

Most cultural resources attributed to the Historic Period date from the Nuclear Energy Period, beginning with World War II and continuing through the end of the Cold War in 1989. However, no systematic survey has been conducted of the Historic Period cultural resources within LANL boundaries, nor have these resources been uniformly evaluated for eligibility for nomination to the NRHP.

Historic data about resources constructed at LANL during the World War II and the Cold War Periods have been obtained for purposes of the SWEIS from the LANL report, *Capital Asset Management Process, Fiscal Year 1997* (LANL 1995a). These data do not include non-building remains of those periods, and the numerous interrelated infrastructure support systems and functional systems present at LANL are not fully identified (LANL 1995c). The LANL Cultural Resources Database of potential historic facilities includes many existing and demolished structures.

A search of available data indicates that about 2,232 buildings, structures, or trailers that date from the Nuclear Energy Period existed at LANL in 1995. Analysis of the data shows that about 515 resources date from 1943 through 1956, and 1,717 date from 1957 through 1989. These numbers are approximate because nonbuilding resources have not been identified and demolition actions are ongoing.

E.6.4 Traditional Cultural Properties in the LANL Region

Within LANL's limited access boundaries, there are ancestral villages, shrines, petroglyphs, sacred springs, trails, and traditional use areas that could be identified by Pueblo and Athabascan communities as TCPs. The LANL CRMT has a program in place to manage on-site cultural resources for compliance with NAGPRA and AIRFA (LANL 1995c). The Pueblos of San Ildefonso and Santa Clara are considered to be most directly affiliated with archaeological sites at LANL (PC 1995 and Oakes 1997). When there is an undertaking, LANL arranges site visits by tribal representatives of the four Accord Pueblos to solicit their concerns and to comply with applicable requirements and agreements. However, this notification has been limited to Section 106 and NAGPRA compliance. Until recently, there has never been a systematic study of the TCPs at LANL that would identify other communities with potential concerns. Furthermore, TCPs that are natural features, resource gathering places, or hunting areas,

TABLE E.6.3–1.—*Historic Sites Identified by the SWEIS*

HISTORIC PERIOD	DATES	CHARACTERISTIC CULTURAL EVIDENCE	NUMBER OF KNOWN ARTIFACTS OR SITES	NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY
Spanish Colonial	A.D. 1600 to 1849	• Wagons • Iron hardware • Horse equipment • Pueblo V artifacts	0	
Early U.S. Territorial/ Statehood	A.D. 1850 to 1942	• European and Hispanic homesteads • Commercial ranching concerns/guest ranches: Pond cabin, Anchor Ranch, and the Los Alamos Ranch School	87	Twenty-two sites are eligible for the NRHP. One site is also listed on the State Register of Cultural Properties.[a]
Nuclear Energy	A.D. 1943 to present			
a. World War II/ Early Nuclear Weapon Development Period	A.D. 1943 through 1948	• Original Los Alamos townsite • World War II Manhattan Project facilities where the design and manufacture of the "Trinity Site: bomb; Hiroshima bomb, "Little Boy;" and Nagasaki bomb, "Fat Man" occurred • LANL sites where all U.S. Nuclear Weapons were made from 1946 to 1950 • Common artifacts consist of buildings, security fences and stations, barricades, roads, reinforced protective structures	515 (1943 to 1956)	Seventy-seven sites are eligible for the NRHP (1943–1956). One is also listed on the State Register of Cultural Properties.[a]
b. Early Cold War Period	A.D. 1949 through 1956	Pronounced expansion of facilities		
c. Late Cold War Period	A.D. 1957 through 1989	Continued expansion of facilities	1,717	These LANL buildings have not been assessed for NRHP eligibility.
Total Number of Sites			2,319	

Sources: LANL 1995–1996, LANL 1995b, LANL 1995c, McGehee 1995, and NMHPD 1995.

[a] The Ashley Pond cabin is listed twice because its occupation and use spans two historic periods.

have neither been identified nor considered in the evaluation of effects from LANL undertakings.

According to the LANL compliance procedure, American Indian tribes may request permission for visits to sacred sites within LANL boundaries for ceremonies (Oakes 1997). However, the procedure takes time, and no instances were found to indicate that tribes access ceremonial or other traditional sites by this means.

American Indian TCPs, located on lands outside LANL boundaries, such as tribal lands, state lands, federally managed lands, and private lands, may be potentially affected by LANL activities. Other federal agencies with land holdings in the area that may have TCPs include:

- U.S. Forest Service, Santa Fe and Carson National Forests
- NPS, BNM
- DOI, Bureau of Land Management, Taos Resource Area

Consultations were held with 19 American Indian tribes and two Hispanic communities as part of the SWEIS TCP study. Several contacts were made with 23 American Indian tribes; however, four did not participate in the consultations. Of the contacted communities, only the Pueblo of Santa Ana did not wish to participate at this time. The Pueblo of San Felipe showed interest during repeated telephone contacts and presentations; however, they did not elect to hold consultations during the SWEIS TCP study. All of the consulting groups indicated that they had at least some TCPs present on or near LANL, as summarized in Table E.6.4–1. These resources are present throughout LANL and adjacent lands, including the neighboring BNM, reservation lands, Santa Fe National Forest and U.S. Forest Service land.

The following subsections outline the results of consultations with American Indian and Hispanic communities. These subsections comprise statements made during the consultations, classified by the following categories: ceremonial and archaeological sites, natural features, ethnobotanical gathering sites, artisan material gathering sites, and subsistence features.

E.6.4.1 *Ceremonial Sites*

- *Pueblo of Acoma*—Pueblo of Acoma officials do not claim cultural affiliation to sites in the LANL area except in a general sense as Pueblo people. They do, however, have concerns about the treatment of human remains that may exist in the LANL area. In addition, all archaeological sites in the area are considered sacred to all Pueblo people.
- *Pueblo of Cochiti*—Tribal representatives stated that LANL is part of their ancestral domain.
- *Pueblo of Jemez*—Although LANL is on the periphery of the ancestral Jemez

TABLE E.6.4–1.—*Traditional Cultural Properties Identified by Consulting Communities on or near LANL Property*

	CEREMONIAL AND ARCHAEOLOGICAL SITES	NATURAL FEATURES	ETHNO-BOTANICAL SITES	ARTISAN MATERIAL SITES	SUBSISTENCE FEATURES
Number of Consultations Indicating the Presence of TCPs on or near LANL	15	14	10	7	8

domain, since the days of prehistory, the Jemez people have continued to make pilgrimages to sacred sites in the vicinity of Los Alamos. The Jemez people have shrines in the Los Alamos area, but not in the LANL compound.

- *Pueblo of Laguna*—Representatives from the Pueblo of Laguna indicated that the LANL area is part of Laguna's traditional use area and BNM is an important area to the tribe.
- *Mescalero Apache Tribe*—Tribal representatives stated that at least three ceremonial feast areas are located in the LANL area.
- *Navajo Nation*—Navajo tribal records document that the LANL area is a very old traditional use area with at least 20 ceremonial/archaeological sites in the area.
- *Pueblo of Picuris*—Representatives from the Pueblo of Picuris stated that their people have cultural affiliation with archaeological sites near and at LANL.
- *Pueblo of Pojoaque*—A representative from the Pueblo of Pojoaque stated that the Pueblo has traditional sites in the LANL area. Tribal members mostly travel to the east to hold ceremonies but go in all directions for prayers; e.g., towards Santa Fe and White Rock. Many tribal members long ago went to the Los Alamos area, traveling through San Ildefonso and Garcia Canyon to White Rock. Oral stories often pertain to Jacona Peak and the BNM area. A traditional trail traverses what is now LANL, but it is no longer used due to denied access.
- *Pueblo of Sandia*—Tribal officials from the Pueblo of Sandia said that archaeological sites in the LANL area are important. Sandia is concerned over the treatment of human remains. "They should be left alone," according to tribal representatives.
- *Pueblo of San Ildefonso*—The Pueblo of San Ildefonso recognizes the Los Alamos area as its ancestral domain. San Ildefonso claims to have over 1,500 TCPs within LANL boundaries.
- *Pueblo of Santo Domingo*—Officials from the Pueblo of Santo Domingo said tribal members use springs in the high country for ceremonial purposes, and they are concerned about pollution at these springs.
- *Pueblo of Taos*—Tribal representatives stated that tribal members travel to areas near LANL for ceremonial functions; and that, although they no longer conduct traditional activities in the immediate area of LANL, it is still considered to be sacred to them.
- *Pueblo of Zia*—Traditional routes to buffalo hunting areas in Colorado traverse LANL, along the Cuba Road and up the Rio Grande. Another route goes along the base of the Pajarito Plateau, east of LANL. These routes contain many shrines and many of these shrines are recounted in oral stories. There are also many archaeological sites, shrines, and springs in the LANL area that are important to the Zia people.
- *Pueblo of Zuni*—Representatives from the Pueblo of Zuni stated that they are concerned about the archaeological sites in the region; e.g, the Stone Lions at BNM. Prehistoric pottery affiliated with the Zuni people has been found at LANL.
- *Hispanic Communities*—Hispanic communities identified several ceremonial sites, such as traditional pilgrimage route that leads from the Jemez Springs area, through LANL, and along the highway to the Santuario de Chimayo. Another pilgrimage route exists between Wagon Mound and the Santuario de Chimayo. Pilgrimages are conducted on foot both at Christmas and during Lenten week. A third pilgrimage or procession area exists along Highway 84 near Abiquiu. Many pilgrimage trails converge on the Santuario de Chimayo in the Nambe area. Some representatives mentioned that privatization of some land had limited access to pilgrimage trails and sacred sites.

Descansos, crosses or stone markers along pilgrimage routes are used as sites to remember the dead. Ceremonies are also conducted along the acequias in some villages to protect the water and ensure good crops, according to Hispanic consultants.

E.6.4.2 *Natural Features*

- *Pueblo of Acoma*—Officials from the Pueblo of Acoma stated that the LANL area is sacred.
- *Hopi Tribe*—Hopi tribal representatives stated they hold the Jemez Mountains as traditionally significant, and Hopi Kachinas go to their home in these mountains.
- *Jicarilla Apache Tribe*—The Jemez Mountains were identified by the Jicarilla Apache Tribe as culturally significant. They have traditionally bathed in hot springs in various locations, including the Jemez area and Pagosa Springs.
- *Mescalero Apache Tribe*—The Mescalero Apache tribal officials indicated that Los Alamos Mountain is of traditional importance.
- *Navajo Nation*—Tribal documents of the Navajo Nation identify 19 natural features in the LANL area. The Jemez Mountains are significant and Pajarito Mountain and Pajarito Springs are considered sacred. Pajarito Mountain is tied to the Navajo creation story.
- *Pueblo of Picuris*—Tribal members of the Pueblo of Picuris have traditionally used the hot springs at Jemez.
- *Pueblo of Pojoaque*—Oral stories from the Pueblo of Pojoaque pertain to Jacoma Peak and BNM.
- *Pueblo of Sandia*—Springs in and around LANL are important to members of Sandia Pueblo. They consider all springs as shrines, sacred places for prayer.
- *Pueblo of San Juan*—Representatives from the Pueblo of San Juan stated that among the significant resources in the LANL area, Jacona Peak is one of the most important.
- *Pueblo of Santa Clara*—Tribal officials from the Pueblo of Santa Clara stated that the entire Pajarito Plateau is significant not only to Santa Clara but to all the Pueblos.
- *Zia Pueblo*—One of the important features to the Zia people is Santa Clara Peak.
- *Pueblo of Zuni*—Representatives from the Pueblo of Zuni said the LANL area is part of their traditional use area and tribal members collect water in the vicinity. They are concerned about the effects of LANL activities on springs.
- *Hispanic Communities*—Natural features were not mentioned as important Hispanic TCPs in any consultations.

E.6.4.3 *Ethnobotanical Gathering Sites*

- *Hopi Tribe*—Members of the Hopi Tribe gather cattails from the LANL area for dances.
- *Pueblo of Jemez*—The Jemez people have traditionally collected and continue to collect medicinal plants and other plants in the Los Alamos vicinity.
- *Jicarilla Apache Tribe*—Members of the Jicarilla Apache tribe collect willow, sumac, and medicinal plants in the LANL area.
- *Mescalero Apache Tribe*—Members of the Mescalero Apache tribe have plant gathering areas near LANL.
- *Pueblo of Nambe*—Officials from the Pueblo of Nambe stated that the Los Alamos area is a Nambe traditional use area and the people from the Pueblo gather plants in the vicinity.
- *Pueblo of Pojoaque*—Pojoaque tribal members go towards Santa Fe and White Rock for pinyon nut gathering and plant gathering.

- *The Pueblo of Sandia*—Tribal officials cannot give specific plant collection locations because weather patterns change and collection locations change annually with weather patterns. They collect wild tobacco, prickly pear, yucca root, gooseberries, chokecherries, osha, wild spinach, bee weed (for paint), wild garlic, and juniper roots from the Jemez Mountains and around Fenton Lake, as well as pinyon nuts and evergreens from the Jemez Mountains.
- *Pueblo of Zia*—Many herbs are collected by members of Zia Pueblo in the canyons around LANL, such as Pueblo Canyon.
- *Pueblo of Zuni*—Representatives of the Pueblo of Zuni said tribal members collect plants in the LANL vicinity.
- *Hispanic Communities*—Many wild plants are gathered for medicine and food by traditional Hispanic people in the LANL region. The Jemez Mountains were mentioned during the consultations as an important area for gathering pinyon nuts, wild fruit, and herbs. The areas where herbs are picked vary according to season and year. Some of the medicinal plants that are gathered in the LANL region include cota, osha, yerba buena, and chimaha. Participants mentioned that families and groups make outings to the mountains to gather plants. Barranca Mesa, north of LANL boundaries, and Ojo Caliente were identified as important areas to gather wild plants.

E.6.4.4 *Artisan Material Gathering Sites*

- *Pueblo of Jemez*—The Jemez people collect obsidian and other minerals from the area.
- *Jicarilla Apache Tribe*—Members of the Jicarilla Apache tribe collect clay, pigment, and plants for basketry in the LANL area, including the Jemez Mountains, the Santa Clara and Taos areas, and the Sangre de Cristo Mountains. Micaceous clay is collected in numerous places including the El Rito area.
- *Pueblo of Nambe*—Members of the Pueblo of Nambe gather minerals in the vicinity.
- *Navajo Nation*—Navajo tribal records document four resource gathering areas in the LANL area.
- *Pueblo of Picuris*—Tribal members of the Pueblo of Picuris have collected chert near Cochiti, and their ancestors collected obsidian in the LANL area.
- *Pueblo of Taos*—Tribal members collect clay and wood from the Santa Clara and San Juan areas.
- *Pueblo of Zia*—Obsidian is collected at Obsidian Ridge by tribal members of Zia Pueblo.
- *Hispanic Communities*—Members of the Hispanic communities mentioned wood for vigas and latillas, wood for carving, and plants to dye wool, as materials commonly gathered from the areas around LANL. Some dye plants such as goldenrod are gathered along acequias. Other plants are gathered along roadsides (chamisa and cota) or in the foothills (Mormon tea). Wood for carving Santos is collected in the Los Alamos area, including cottonwood and aspen from the Santa Fe National Forest. Juniper is gathered in bulk by families for carving. Santa Clara, El Rito, the Tecolote area near La Madera, and Dixon were mentioned as areas where clay is gathered. Micaceous clay is gathered at Petaca. Special crystals called Lagrimas de Dios are collected near Dixon by artisans. One consultant mentioned that she had formerly gathered ephedra and other plants to dye her wool along the roads around LANL, but had discontinued the practice because she believed the plants were contaminated.

E.6.4.5 *Traditional Subsistence Features*

- *Pueblo of Jemez*—The Jemez people collect water from ancient springs in the area and hunt deer and elk that have migrated into the ancestral Jemez domain from the LANL area.
- *Jicarilla Apache Tribe*—Members of the Jicarilla Apache Tribe hunt in the LANL area, and some of their livestock graze near the southern border of the Jicarilla Apache reservation.
- *Pueblo of Nambe*—Officials from the Pueblo of Nambe stated that the Los Alamos area is a Nambe traditional use area and the Pueblo has TCPs located within the vicinity. Many traditional, ceremonial, and culturally used products are gathered within the area that they feel may be affected by current and future LANL undertakings. The Pueblo of Nambe people use the Los Alamos area for hunting, fishing, and wood gathering. In addition, tribal members farm, raise crops, provide feed for livestock, and gather plants and minerals in the vicinity.
- *Navajo Nation*—Tribal documents of the Navajo Nation identified two trade centers in the LANL area.
- *Pueblo of Pojoaque*—Many tribal members from the Pueblo of Pojoaque went to the Los Alamos area long ago, traveling through San Ildefonso and Garcia Canyon to White Rock, and many still hunt in this vicinity.
- *Pueblo of Sandia*—Members of the Pueblo of Sandia hunt deer and elk in the Jemez Mountains and north to the Colorado Border. They fish in the Santa Clara and Jemez areas, Santa Cruz Lake, and at Nambe Falls.
- *Pueblo of Taos*—Tribal members use the Rio Pueblo and the Rio Grande for collection of water.
- *Pueblo of Zia*—Activities that historically have taken place in Pueblo Canyon include animal collection using deer traps. Tribal members consider these deer traps to be traditional properties. The area around LANL was a prime hunting area.
- *Hispanic Communities*—Protection of the water rights and water quality of the acequias are very important to traditional Hispanic communities. Rituals are performed in the springtime to bless the water, along with the annual cleaning of the acequias. This was mentioned by several informants as very important to the community. One informant said that this was the way her children learned about the ways of the people, by working together to keep the ditch clean and to allocate the water.

Hunting and fishing were mentioned by Hispanic informants as being important traditional subsistence activities that bring together families. Outings into the mountains to hunt also include gathering pinyon nuts and fruit or firewood and involve several family members. Informants mentioned that their families used to hunt in the LANL area, but now are prevented by LANL fences and private land. People in Jemez Springs said that hunting and fishing is important to their local traditions. Wild meat is a staple of their diet in many families, and teaching one's children to provide their own meat and jerky was mentioned as an important tradition. A participant described hunting for deer in Guaje Canyon and wild turkey around Barranca Mesa many years ago, but he no longer has access to these areas.

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